

SUPPURATIVE DISEASES
OF
THE EAR

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The Harbeian Lectures, 1892-93.

ON THE
PATHOLOGY AND TREATMENT
OF
SUPPURATIVE DISEASES
OF
THE EAR.

BY GEORGE P. FIELD,
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PREFACE.

THESE Lectures have been printed by request of the President. They have been carefully revised throughout, and the Author hopes they may be of some slight service to the Members of the Harveian Society.

GEORGE P. FIELD.

34 WIMPOLE STREET, W.

Feb. 1893

ON THE
PATHOLOGY AND TREATMENT
OF
SUPPURATIVE DISEASES OF THE EAR.

MR. PRESIDENT AND GENTLEMEN,—My old friend and teacher, Dr. Sibson, whose resident Medical Officer at St. Mary's Hospital it was my privilege to be, delivered in the year 1875 the first Harveian Lectures. His long and assiduous labours in their preparation are still fresh in my memory.

It has been my good fortune to attend most of the courses of lectures that have, year by year, been delivered before our Society by men eminent in various branches of our profession, and it is therefore, with considerable diffidence that I have undertaken the task of seeking to follow in their footsteps. My sense of responsibility, I may add, is equalled only by that of the honour conferred by your appointment of me as your present lecturer, an expression of your confidence which I felt myself bound gratefully to accept.

I will now, without further preface, state that I intend in my three lectures to discuss the conclusions

that, after an experience of a quarter of a century, I have arrived at as regards the pathology and treatment of suppurative diseases of the ear. Aural diseases accompanied by, or resulting in a purulent discharge are simply legion, so, in order to illustrate my subject as a whole, and to give definiteness to my remarks, and render them practical in character, after a few words on bacteriology, I shall take each affection singly, and, having dealt with it from a clinical standpoint, shall proceed to describe its pathological features and modes of treatment.

That diseases of the ear are not so well understood as they ought to be is a fact demonstrated to every aural surgeon by the frequency of the cases of suppurative disease in which he is often, *too late*, requested to intervene, and finds that treatment has been defective, hopelessly delayed, or absolutely *nil*; so that rapidly fatal meningitis, cerebral disease, or deafness partial or complete has supervened.

It is difficult to realise how large is the number of persons in this country afflicted with deafness. It is an affliction which, more than all others, people are anxious to conceal, partly, perhaps, because it suggests what it tends to engender,—a dulness of the mental capacities, and partly because it entails upon the friends and associates of the sufferer the irksome necessity of making themselves heard.

The avowedly deaf man feels that his social worth must ever be heavily discounted. Taking our own profession, for instance, can we say that there are many of its members known, upon their own admission, to be deaf? I think to this question one may reply emphatically in the negative, and yet I am acquainted with a great many. They would not on any account

have their defect known, for the world at large is fully alive to the fact that the competent practitioner should possess all his senses in their greatest perfection. I have seen as many as ten doctors in one day, each of them, as I could not help observing, desirous if discovered by his fellows, of figuring as my visitant on behalf of patients, and yet really come to consult me for his own hardness of hearing. Members of other professions—barristers, soldiers, clergymen, do all in their power to hide their infirmity. An officer brought his daughter to me, and, after she had been treated, he returned, and confessed that he too wanted to be seen, but he would not for anything have his daughter know that he was deaf. If it once got about, said he, that his hearing was impaired, he would be ruined in his profession. Among the men of his regiment the idea prevailed that he was stupid, and he was content to be thought so, for the stupidity after all, he believed, was on their side. It is manifest that the magnitude of their failing is not always realised even by the deaf themselves, otherwise we should not lately (a) have had the spectacle of the abrogation of a trial for murder because two jurymen, though incapable of hearing the evidence, had gone through the semblance of performing their duties, and this notwithstanding the express proviso of the County Juries Act (Section 10), that the names of men disabled by deafness, blindness, or other permanent infirmity shall be struck from the lists of qualified jurors.

The question arises, can we do anything to prevent the present frequency of deafness? I answer, without hesitation, that a great deal can be done.

(a) *St. James's Gazette*, Sept. 21st, 1892, p. 11.

By rational and early treatment, perforation of the drum-head, for example, can be healed and deafness may be obviated. Again, where the complications are grave, life may be saved by a correct diagnosis, followed up by prompt puncture of the membrana or by the opening up without delay of the mastoid antrum and cells. It is true that we are beginning in some measure to improve upon our backwardness in the practice and teaching of aural surgery, systematic instruction being now included in the course, at any rate, at all our Metropolitan Medical Schools; but much yet remains to be done. At the time when I was helping Mr. Toynbee at St. Mary's, our hospital was the only one in London having attached to it a teacher of this branch of surgery. I am proud, Mr. President, as I am sure you must be, to think that our hospital led the way in the establishment of an important factor in modern medical education. It has come about that often, now-a-days, students are examined in the subject of ear disease, and they take care accordingly to make themselves, to some extent, acquainted with it. This alone is a great advance on things past, for I am sorry to say that my experience as Dean of a London Medical School shows that a great number of estimable men never dream of attempting to familiarise themselves with any topic in which they are unlikely to be examined; and, considering the five years' lecturing they have to endure, one cannot hold them much to blame.

As regards the pathology of suppurative otitis media, I wish as briefly as possible, in view of the shortness of the time at our disposal, to lay before you some of the more recent results arrived at by observers both British and foreign.¹ There are few busy practitioners

that have watched the rapid progress of pathological knowledge during the past 15 years without experiencing an impatience amounting sometimes almost to exasperation when, face to face with some obstinate complaint, they find themselves unable to perceive that all this new science gives them a tittle of substantial aid. If one, however, compares the results of treatment some 20 or 30 years ago with those of the present day, it is impossible not to admit that times have changed for the better, and that, in fact, splendid practical advance has been made in the treatment of aural disease. Although it may be true that the majority of cases are managed much as they were in years gone by, there is yet this difference in our treatment, that it is based no longer on empiricism, however practical, but upon definite and well recognised principles : we can justify our methods by reasons as well as by results. In olden days, conclusions as to the character of disease and the probable efficacy of medicines and of modes of treatment were deduced not so much from observed facts as from fancied analogies among things natural, and the healing art, as a whole, was held to be dominated by the influence of the stars and powers unseen and supernatural. Later, the teachings of experience were clouded by false theories of the construction of the frame corporeal. In these last times—we may say since when John Hunter taught how death itself, when it comes, is no new thing to man, but only the final stage in the processes of life—a new pathology has arisen. Nature has been interrogated, and we have learned from her that though disease may have its phases according to the forces brought to bear upon it, still those forces are of natural origin and can be antagonised alone by natural methods. We now know

our enemy and the manner of his attack, and when deadly complications arise we have greater resolution and resource in combating them. From the observations of many writers we have arrived at this broad result, that, as expressed in Hüter's dictum, suppuration, *i.e.*, natural suppuration, is a specific disease endemic in the whole world; or, defining it yet more closely, we may state it to be a group of intimately allied but distinct specific diseases caused by different and well characterised organisms. It is to the genius of Lister that we owe the recognition of the laws to be laid down for its prevention.

Of course, I would not have you to infer from my present remarks that I ignore the possibility of the production of suppuration by artificial means. The familiar croton oil pustule is, as you are aware, free from germs, and its pus (an exudation filled with dead leucocytes) is caused by a chemical irritant. Similar aseptic suppuration, as Grawitz and De Bary among others have determined, and as we might have expected, may be brought about by the application of such irritants as caustic ammonia, digitaline, and cadaverine.

The natural causes of suppuration due to chemical irritants are parasites the secretions of which either directly, or by inducing fermentative changes in the fluid of the living tissues they infest, attract and cause the death of exuded leucocytes, and, when absorbed into the general circulation, give rise to toxic phenomena included by us under the term "fever."

These organisms (or microphytes), it must be clearly recognised, are not the sole factors in the production of the diseases which they characterise. Thus, the mere introduction into the middle ear of a pyogenic coccus

from the mouth or air passages, where it normally exists, by Valsalva's method of inflating the tympanum, will not in itself determine the commencement of otitis, for the production of which preparedness of the host is as necessary as the presence of the parasite.

On the other hand, any influence bringing about an abnormal condition of the mucous membrane, and concurrently an exudation into the cavity of the tympanum of mucus or serum serving as an acclimatising medium, or culture-fluid, for the development of pyogenic organisms—whether it be congestion of the drumhead set up by ingress of water in bathing, or inflammation of reflex nervous origin (cold in the head), or a general fever, such as influenza, measles, small-pox, scarlatina, or typhoid—may be provocative of a discharge from the ear. Suppurative otitis may thus be simply a by-product in the course of many diseases, and may present no features diagnostic of its modes of origin. In the case of pyæmia, aural suppuration may give character to a general affection of the body. One mycotic organism, the *Aspergillus niger*, claims more than common attention on account of its remarkable life history. This fungus may leave its wonted *habitat*, the superficial portion of the epidermis, and, penetrating the deeper layers of the membrana tympani, may cause its perforation. Professor Délépine has lately shown (Path. Trans., Vol. XLII., p. 432) that this fungus is to a limited extent pathogenic in rabbits. Before the study of pathogenic microphytes had been systematised, Grawitz thought that by suitable acclimatisation he could confer toxic properties on the common *Penicillium glaucum* and other moulds. Later researches have shown that fungi cannot be so readily rendered hostile to animal life. Though acclimatisation has not

the importance Grawitz claimed for it, we know that the powers of micro-organisms may be greatly modified by cultivation under different conditions. Recognising the interaction of two ever changing living things, the parasite and the host, we are now beginning to understand the variability of infectious diseases, the nature of immunity from the same, and other old-world problems, so that the present must necessarily appear as a bright epoch in the future history of pathology.

The following pyogenic bacteria have been encountered in middle ear suppuration :—

Streptococcus pyogenes.

Staphylococcus.

Pneumococcus of Fränkel.

Pneumobacillus of Friedländer.

Tubercle bacillus.

I have handed round drawings of some excellent microscopic preparations of these organisms made by Mr. J. Jackson Clarke, so I shall not now devote any time to a discussion of their morphology, but shall instead dwell on the different clinical effects attributable, so far as is known, to their action.

It appears that *Streptococcus pyogenes*, first detected by Ogston in the pus of an abscess, is the most frequent cause of acute suppuration. It is not only the most ubiquitous, but also the most dangerous of the pyogenic organisms, being usually the active agent when suppurative otitis eventuates in meningitis, cerebral abscess, thrombosis of the lateral sinus, or general pyæmia. In one case of Zaufal's it was this streptococcus which determined a hæmorrhagic discharge. We thus find that the commonest and most pernicious of the suppurative diseases of the ear is brought about by the same organism which is met with as the most frequent cause

of acute osteo-myelitis, ulcerative endocarditis, and puerperal fever, and which in all probability when confined to the corium determines ordinary erysipelas. If it were necessary to found an argument for the adoption of strict antiseptic treatment in aural practice, evidence of the wide distribution of this deadly parasite would be alone sufficient.

The species of *Staphylococcus* most commonly met within the ear is *S. aureus*. Not unfrequently it is found to have caused acute suppuration of the middle ear (Fränkel and Lussano, Dunin, Röhrer, Netter). Though generally less dangerous, it has a wider pathogenic potential than streptococcus. It has been discovered in abscess, thrombosis, pyæmia, and endocarditis.

Among its many other effects are acne, and sycosis-pustules, boils, carbuncles, and ordinary warts. We may hence deduce a possible reason for the frequent association of purulent otitis with adenoids of the pharynx, if, like enlarged tonsils and cutaneous warts, these bodies are hyperplastic growths due to the irritation of the staphylococci.

Pneumococcus, proved by Fränkel to be the immediate cause of croupous pneumonia, has been frequently found in the pus produced in acute inflammation of the middle ear; and in each of these diseases (as Zaufal and others have pointed out) its effects run a definite course. This fact has led me to attribute to pneumococcus numerous cases of otitis which occurred in my practice during the late influenza epidemic. Unfortunately, otitis due to pneumococcus is not uniformly brought to a satisfactory finish after a rapid cycle of pathological conditions, as it results occasionally in a general meningitis. Like the organisms already mentioned, pneumococcus has

been met with in endocarditis. In rabbits it produces a true septicæmia.

The pneumobacillus of Friedländer has been detected by Zaufal as a sole immediate cause of middle ear suppuration. Like Fränkel's pneumococcus it is encapsuled when occurring in the bodies of animals, not so when artificially cultivated; but is distinguishable from pneumococcus by its more elongated form and by its refusal to stain by Gram's process. The original view of Friedländer as to the excitation of croupous pneumonia by this bacillus has been shown to be unjustified.

Tubercle bacillus, strictly speaking, is not a pyogenic organism; but wherever a tissue attacked by tubercle is exposed to infection by pus-cocci, there chronic suppuration takes place. Thus it is that a thin discharge from the ear due to tuberculosis may at any time become thick and purulent. One may take it as a rule that where, in spite of free drainage, there is chronic suppuration, its cause is generally tuberculosis. In the ear this begins either as an affection of the mucous membrane, or as osteo-myelitis of the mastoid.

In severe tubercular meningitis the middle ear is always filled with muco-pus, and our pathologist at St. Mary's tells me that, since his attention was directed to the matter by Dr. Lees some years ago, he has examined the muco-pus in many cases and continually found it to contain tubercle bacilli. In preparations of this muco-pus may be seen crowds of tubercle bacilli excluding all other organisms.

To the treatment of ear disease producing symptoms of meningitis, I shall have occasion to refer somewhat later in my discourse.

The bacteriology of suppurative otitis, on account

of the tremendous issues involved in the progress of the disease, is a subject worthy of our most earnest attention. When perhaps in thirty years or more, it has entered into the practical daily consciousness of the whole of the profession, we shall of course see no more neglected cases. At a yet later period the minds of an intelligent lay-public will be revelling in a very definite, if somewhat oddly distorted vision of microscopic parasites; and a future generation of practitioners will receive with due submission their patients' report, that such and such a lotion is unsuitable for the particular bacillus with which they are infested. At present it must be confessed that the lay-public have somewhat hazy notions of medical and surgical topics in general, and of their phraseology in particular, or else a lady, the widow of a member of our profession, would not have come to me a short time ago, and instead of saying, "I fear I have broken my drum," have exclaimed "I am afraid I have ruptured my perinæum."

One can scarcely avoid the temptation to refer in this connection to the true story of the Aurist's next door neighbour, a fashionable and eminently practical gynæcologist, who after giving his patient the intimation, "Really, Madam, I cannot discover much that is wrong," was dumbfounded to receive her reply, "What has this to do with my ear?"

The significance of suppuration in the middle ear is at once apparent when we consider that the tympanic cavity has on its *inner* side the labyrinth, *below* it the jugular vein, *above* it cerebral dura mater, and *posteriorly* openings into the mastoid process, and that the only safe outlet for pus, except by perforation of the membrana tympani, is through the Eustachian

tube, through which, however, it finds its way with extreme rarity.

When, owing to chronic suppurative otitis, caries of the tympanic walls is set up, pus, if it penetrates *upwards*, causes meningitis or abscess of the brain, if *downwards*, septic thrombosis of the jugular vein or pyæmic abscess of the lung and possibly also of the liver. Again, if it proceeds *inwards*, the facial nerve and carotid artery are jeopardised. Attacking the mastoid process, pus may occasion, by extension of inflammation, thrombosis of the lateral sinus, meningitis, or abscess of the cerebellum. Pneumonia, pleurisy, Bright's disease, and amyloid degeneration are among the possible more remote effects of persistent aural suppuration.

These details do not seem to be yet appreciated, for there come into my hands from time to time cases which have been allowed to go untreated for years, because some medical man has told the parents of a child that any attempt to arrest a discharge from its ears would be worse than useless, would, in fact, endanger life, and should, therefore, on no account be permitted. With some the notion underlying such advice appears to be that suppuration of the ear acts vicariously in obviating inflammation of the brain. With others the idea evidently prevails that, inasmuch as the ear is an organ of great delicacy, and "Fortune brings in some boats that are not steered," the cure of otitis is best entrusted to Nature, although, unhappily for the said doctrine, this most impartial of nursing mothers is as greatly concerned in the welfare of pus bacteria as in the maintenance of the hearing of the last and most wayward of her offspring—man. The once common persuasion, held by many, that discharge from the ear is salutary, indeed, well

nigh necessary, is paralleled in absurdity only by the plea for tinnitus facetiously put forward by one P.S. in "Quid pro Quo, or a Theory of Compensations," quoted by Tom Hood, to wit, that the deaf man in lieu of the comfort and entertainment of natural sounds "is regaled with an inward Musick that is not vouchsafed unto a person who hath the complete Usage of his Ears."

Comfort and entertainment may be afforded in such a case as that described by Roosa ("Diseases of the Ear," p. 348) of a young lady patient, who suffered from what he terms a "pleasing musical concert." She heard in the morning C Sharp, B Flat, F Sharp in right, B in left. At night E Flat, C Flat,—somewhat monotonous one would think. I should imagine not much compensation could be got out of sounds described by patients as the barking of dogs, crying of a child, chirping of crickets, buzzing of bees, or the shrill shriek of a railway whistle.

We cannot afford to lose sight of the fact that, as Sir William Wyld has said, "So long as otorrhœa is present, we can never tell how, when, or where it may end, or what it may lead to."

I propose dealing primarily with those instances of otitis media in which paracentesis is requisite; and then with those in which perforation has resulted. I shall next treat of traumatic injury to the membrana tympani, and of facial paralysis as a complication. I shall, further, speak of suppuration in the external auditory meatus, and shall proceed to discuss some of the graver aspects of neglected ear disease, for instance, mastoid abscess and caries resulting in affections of the brain and more distant organs, and shall conclude with some reference to recent advances in brain surgery in their bearing on otology.

The first disease of which I would invite your consideration is acute otitis media in young infants, simulating and liable from its symptoms to be mistaken for meningitis. It is one which has long been of considerable interest to me, but which, it is greatly to be regretted, has not yet generally received the benefit of treatment.

To your President, Dr. Cheadle, and to Dr. Lees and to Dr. Barlow, of the Children's Hospital, Great Ormond Street, who first called my attention to the special features of this disease, belongs the credit of suggesting that its symptoms pointed to an accumulation of pus within the tympanum and resultant pressure upon associated structures. In several of their cases I have resorted to puncture of the membrane with the most gratifying results, and thus, I am sure, the lives of many hundreds of children may be saved. The operation has, I understand, become common at the Children's Hospital, and is now performed by the house-surgeons. By the physicians at St. Mary's I have had numerous infant patients sent to me for paracentesis; and I cannot better illustrate my subject than by giving you, as I have permission to do, an outline of a particularly interesting case under the care of Dr. Lees.

The patient, a girl, *æt.* 6½ months, had suffered for about a fortnight from a severe attack of bronchopneumonia, during the course of which she had twice been saved from imminent death, first by leeching and then by the application of the ice-bag. She lay in a semi-comatose condition, and retraction of the head, noticeable in some degree nine days previously, had recurred to a marked extent; the breathing had ac-

quired the Cheyne-Stokes character ; the pupils were equal, but contracted, and there was occasional slight strabismus, with a little jerking of the forearms and hands. Vomiting had taken place only once, and the bowels were not constipated. Evidently catarrhal inflammation had extended up the Eustachian tubes, and there was now the greatest risk of an attack of basal meningitis affecting, as usual in such cases, the area supplied by the vertebral arteries.

At Dr. Lees's request I punctured both membranes, causing a little blood but no pus to escape. The immediate effect of the paracentesis was a lessening of the retraction of the head, which in two days had quite disappeared. Improvement continued for ten days after the operation, and the cerebral symptoms vanished. There was then an obvious onset of pain in the left ear, with drawing up of the left shoulder. Relief was given by a minute dose of morphia, but two days later there was a return of the earache, followed by an attack of dyspnœa, and shortly afterwards, *i.e.*, just two weeks subsequent to the performance of paracentesis, the cerebral symptoms recurred. Having been again called in, I repunctured the membranes, and upon inflation of the tympanum, blood flowed from the right and pus from the left ear, with the effect of almost immediately dismissing the untoward symptoms. The child's convalescence was uninterrupted, and perfect health and hearing were regained.

But for the paracentesis, death would probably have followed in this case upon a gradual increase of the meningeal symptoms, or, even had death not ensued, chronic hydrocephalus and impairment of reason, if not

complete idiocy, must have been the patient's lot. I operated on a similar case this morning, a patient of Dr. Cheadle's, æt. 14 months.

It is well that I should conclude this history by remarking that in many instances of aural suppuration accompanied by incipient meningitis paracentesis has proved ineffectual, and that either because the children have not been brought under the surgeon's notice until the retraction of the head has lasted a week or more, or else because, after the puncture of the membrane, there has been no resort to the use of Politzer's bag—a proceeding absolutely necessary for the evacuation of pus.

In these cases it is desirable to perform paracentesis even when there is no outward bulging of the membrane, as the tympanum is usually filled with muco-pus, and a free incision in some instances seems to decide a favourable turn in the malady. In meningeal tuberculosis, especially when of a severe type, the muco-pus, as already mentioned, is apt to contain myriads of tubercle bacilli, though there may be no tubercles visible in the tympanic mucous membrane.

Trivial causes sometimes bring on abscess in the middle ear with great rapidity, and paracentesis without delay may be absolutely necessary for the preservation of life. Thus, some years ago I was called down to Marlborough by Dr. Blake Maurice to see a young lady who, only three days previously, had come home with earache from being out in a cold wind whilst watching a school cricket match. She had gone speedily from bad to worse, at the time I saw her was only temporarily conscious, complained of intense pain over the side of the head, and had a temperature of 104°, and facial paralysis. I found no discharge

from the ear, but the membrane was bulging, and on puncturing it, I let out, with the aid of Politzer's bag, a large quantity of pus. The facial paralysis soon passed off, the membrane healed, and the patient completely recovered, although her condition had been such that without operative interference she must instantly have died.

In cases of scarlet fever paracentesis is often urgently required. Although in this disease the membrane, as a rule, gives way spontaneously, and pus is got rid of without danger to life, the hearing may be partially or wholly destroyed by the natural process of evacuation. The clean cut made by the paracentesis knife almost invariably heals well and rapidly, leaving the hearing unimpaired. The bursting of the membrane through the pressure of pus behind it may result in the formation of a permanent perforation. This, it is true, may be so small or may be in such a situation that it causes but a slight blunting of the original acuteness of hearing, and it may even remain unsuspected by the sufferer himself for the term of his natural life. The perforation may, on the other hand, be large, and the disorganisation of the middle ear by the accumulation of pus in its cavity may be so complete that the ossicles are injured or even removed from their connections. For these reasons I would strongly advocate that in all cases—whether from scarlet fever, measles, or from acute inflammation of the drum—if the temperature suddenly rise without clear cause, the ears be looked to, and be promptly treated by puncture, should there be any bulging membrane.

Not only could many a life be saved by this procedure, but thousands of people would, I am convinced, be spared an existence of wretchedness through loss of

hearing. In scarlet fever children perish literally by hundreds, not from the original disease, but from one of its very usual concomitants, undiscovered acute aural inflammation ; the temperature cannot be lowered, for unfortunately the membrane does not give way to the pus that presses on it, and meningitis and speedy death supervene. These facts were brought very vividly to my mind some years ago by a terrible case of scarlet fever.

The patient, a boy, was an only child. Sir William Jenner and Dr. Broadbent were called in consultation. The temperature rose to 106° . Cold bathing and other remedies would not lower the fever. The physicians diagnosed that the ears were causing the trouble. I was called in consultation, and found both membranes bulging, and punctured them with a satisfactory result. I am quite sure that in a few minutes the patient would have died.

I cannot too strongly urge upon the profession the importance of paracentesis in such cases as those described. Not very long ago it was an operation undreamt of by the great majority of medical men, and if some few did think of it, but a small proportion of these could tell whether the membrane were bulging or not, or, if it were, knew how to incise it. I am afraid that at the present time the necessity of paracentesis in certain cases is sadly overlooked, and yet the operation is a simple one. The head must be securely supported, and the drum must be made clearly visible by means of a speculum, and then punctured in its lower and posterior part, where the bulging is almost always the greatest. As an example of the strange way in which an ear affection, relievable by paracentesis, may be overlooked, and also as an interesting instance

of extraordinary brain conditions entirely due to the presence of intratympanic pus, I will give you in brief some account of a patient of mine who came to me with a small perforation. The history he gave of his case was to the following effect :—

The patient, some six weeks before his visit to me, was taken with occasional pain extending from the centre of the forehead round about the right ear to the nape of the neck, and intermitting for from two to forty-eight hours.

Attributing his suffering to disorder of the stomach, he thought nothing of it until one evening, about a month after his first seizure, he had an acute attack whilst on his way home from the city. When nearing his journey's end, through some unaccountable impulse he took a wrong turning, and he wandered about five hours before, thoroughly exhausted, he reached his own home. His doctor then gave him some soothing medicine ; but in a few days the pain recurred, bringing with it a feeling of depression. A week later, at one o'clock on a Sunday morning, on leaving his brother-in-law, he took a cab to go to his home, not a mile distant. From that time he was missing and his mind remained a perfect blank until, on the following Wednesday, something, as he says, burst in his head, and a discharge came from his ear. He then discovered himself to be walking in a street in Leicester a place in which he had never been before. The bills in his pockets indicated that he had spent two nights at a London hotel before leaving town. Subsequent inquiries revealed that his general conduct had appeared to be perfectly rational during his protracted spell of sheer automatism. At the time my patient left me, he expressed himself as feeling nearly well again ; but I have

since learned that his ear-ache returned, and that he once more suddenly disappeared, not to be seen again.

One may, I think, fairly conjecture that the curious adventures of this gentleman and the terrible ordeal through which his relatives had twice to pass might all have been spared had only the existence of otitis in his case been early diagnosed, and the malady appropriately treated by the evacuation of the pent-up pus, or, better still, by means preventing its formation.

I should mention here that terribly painful acute inflammation of the drum, which speedily if untended became purulent, was rife during the late influenza epidemic. Its attacks were, I found, cut short and the sufferers, immediately relieved by 10-grain doses of antipyrin, repeated, if necessary, in an hour's time.

Before proceeding to the consideration of another phase of aural disease, I will venture, even at the risk of wearying you with many words upon one subject, to bring before you an additional illustration of the great efficacy of paracentesis in cases of retention of pus within the tympanum.

W. W., a boy of five years of age, was admitted at the London Fever Hospital under the care of Dr. Sidney Phillips on May 11th, 1892, having after two days illness developed the scarlatina rash. The symptoms generally were mild, but on the 19th the temperature rose from 97.4 to 106.4° . Albuminuria set in, with swelling on both sides of the neck. On the 30th the urine was smoky and contained albumen. For a week the temperature varied between 105.4 and 102° , the albuminuria becoming less. Then ensued a week's pyrexia with acute nephritis accompanied by dropsy. Subsequently, till the 17th, the temperature remained

at or below the normal. Suddenly the left eyelid swelled up and assumed a livid hue. On June 17th, when the temperature had run up to 105·6, the left membrana tympani was punctured by Mr. H. S. Collier, the House Physician. The temperature forthwith fell, and on the following morning, when there was a free discharge of pus from the left ear, it had reached the normal, and the boy had fully recovered by July 23rd, and left the Hospital.

I must now pass on to the subject of perforation of the drum-head due to disease or accident.

Perforation may occur in the course of typhoid, influenza, diphtheria, septicæmia, bronchitis, pneumonia, small-pox, syphilis, and Bright's disease, also in diabetes, through the setting up of violent inflammation by effusion of blood into the tympanum, and as a result of the incautious employment of the nasal douche.

During the recent epidemic of influenza the instances of single and double perforation were remarkably numerous. The membrane in influenza is often the seat of hæmorrhagic exudation, as may be seen before its perforation. The discharge when this occurs is freely mixed with blood, and the continuance of pain *after* rupture of the membrane is diagnostic, as McBride has pointed out ; in simple acute inflammation of the middle ear, persistence of pain *after* evacuation of pus indicates insufficient drainage and resulting tension, and is a symptom of grave import ; whereas in influenza it seems to be the rule, and one may notwithstanding expect, in the majority of cases, a good recovery.

As I have already mentioned, tubercle bacillus appearing in an aural discharge may not have originated in the tympanum ; in some cases of plithisis, however,

it is the direct product of tubercular growths therein. It is pathognomonic in this disease that the suppuration runs its course *without* pain, but it is accompanied by rapid destruction of the membrane. My experience is that the advent of aural discharge in consumption always betokens an early fatal result. A short while ago I was called to see a lady who had been suffering for some time from tubercular disease of the lungs. Profuse discharge from both ears had suddenly set in. Although she seemed fairly well and in good spirits, I gave an unfavourable prognosis, and she died a fortnight afterwards.

In diphtheria, as in scarlet fever, the possibility of the supervention of otitis must always be borne in mind. In the case of the daughter of a former President of this Society, who had a sharp attack of nasopharyngeal diphtheria in February 1887, copious purulent discharge from the left ear began towards the end of the first week, when the urgent symptoms were subsiding; and four days later, after some suffering, the right ear also suppurated. When I was called to her early in the third week, I found perforation of both tympanic membranes, which under treatment healed before the end of March. All such cases are not, however, so fortunately disposed of, and the recovery of hearing, as of speech, may in spite of remedies be very gradual in some instances. In July 1889, for example, a boy was sent to me for treatment who had nearly lost the power of speech and was almost totally deaf owing to diphtheria, which had commenced on August 1st in the previous year and had ten days later brought on otorrhœa. In October of this year I saw the patient again. His speech was

then quite restored and his hearing good, notwithstanding persistent double perforation.

So far as has yet been ascertained, the Eustachian tube is never, and the middle ear very seldom attacked by syphilis; it must, however, be remembered that suppurative otitis may be entirely caused or greatly influenced by syphilitic taint. In some instances it may be extremely difficult or downright impossible to come to a definite conclusion as to how far syphilis or neglected otorrhœa—supposing it not to be of specific origin—is potent in the production of a train of symptoms, as in the case which I am now about to relate to you.

Mr. B—, æt. 48, came to consult me in May 1839, having otorrhœa and a large polypus in the right ear. In his younger days he had contracted syphilis. In April 1889, he began to suffer from giddiness and inability to move his left leg properly. When I saw him, he took about twenty minutes to walk, in very short steps, from my hall door to my consulting room, a distance of about ten yards. After the removal of the polypus and the evacuation of the pus pent up by it, his giddiness was temporarily lessened, but his memory began to fail. Six weeks later he had slight paralysis of both legs. By October his memory was quite gone, he could scarcely move his legs, he was unable to support himself in either a standing or sitting position, his vision was impaired, and one eye kept shutting incessantly, he had very little control over or power in his hands, and the bladder was badly paralysed.

During the next five months he was treated for these complaints by many physicians, but without effect; and they all pronounced his case to be as

hopeless as it was peculiar, and in all probability one of cerebral tumour. April 1890 brought with it a serious attack of cystitis, accompanied by high fever and only partial consciousness for three days. On his recovery from this, all his symptoms seemed slightly better, and the course was adopted of compelling him to move and exert himself. Slow but continual improvement resulted, lasting from August 1890 to August 1891, when he was restored to health, and by January 1892 he was able to walk seven or eight miles a day.

I regret that the notes taken in this case were not complete. It is one that calls for serious consideration. I do not think that abscess of the cerebellum could possibly have caused all the symptoms, inasmuch as the gait was not that of cerebral ataxy. I am inclined to think that in addition to the local suppuration there must have been some syphilitic pachymeningitis high up on the cord. Assuming the existence of some pus beneath the dura mater or beyond it in the cerebellum, the evacuation of this through the antrum on removal of the polypus would explain the improvement noticed after the operation. It is, moreover, known that even a subdural accumulation is sufficient to cause optic neuritis and consequent defect of vision.

The phenomena in this case admit of yet another possible interpretation, namely, that the ear affection was originally syphilitic, and that the suppurative process was grafted on to it. It is conceivable that a gummatous thickening of the meninges extending from the right temporal bone to the ventral surface of the medulla took place, involving first the pyramidal fibres of the right, and then those of the left side above the decussation.

Perforation of the membrane and chronic otorrhœa are occasioned by no other disease—certainly in Great Britain—so frequently as by scarlet fever, a special tendency of which is not only to attack the ear, but to leave it in a permanently debilitated and irritable state, of which polypus is a common, and facial paralysis an occasional result. In one case I saw in consultation with Dr. Pegler, purulent otorrhœa from this fever was accompanied by suppuration of the parotid gland. The patient, Miss G. R., æt. 30, had been deaf from chronic catarrh for some years previous to the end of March 1892, when she was seized with scarlatina. This was followed, on the appearance of the rash on April 2nd, by acute delirious mania. The throat symptoms were severe, and a week after they had subsided, namely on April 16th, tumefaction with redness and pain appeared over the left parotid region, and pus was discharged from the ear of the same side. It was subsequently necessary to incise the floor of the meatus to promote free drainage, and tension was further relieved by the application of leeches to the tragus and the tip of the mastoid process. Finally, swelling over the parotid being much increased and fluctuation becoming distinct, repeated incisions were made over the gland, every part of which had become implicated.

By these means and by careful drainage and syringing of the suppurating tissues, the patient's prospects were gradually improved, and the ear and hearing were by May 10th brought into their usual state; but the mental condition remained such that, by the advice of Dr. Hack Tuke, she was removed to an asylum.

It is, of course, impracticable in the absence of precise data to assign the exact cause, secondary to the scarlatina, for the patient's permanent mental aber-

ration ; but it is presumable that the injury effected by the long persistent catarrh from which she had suffered had rendered her obnoxious to brain lesions upon the development of a severe type of otitis media.

The inhalation of sewer-gas, even in minute quantities, as a cause of acute inflammation of the middle ear was, I believe, first commented on by the late Dr. Cassells, of Glasgow. Septic germs from the gas finding their way to the tympanic cavity by means of the Eustachian tube manifestly meet there the requisite conditions for their ready development.

I have had very many cases, especially in children, where profuse otorrhœa has been proved to be occasioned solely by the emanations from defective drains. When otorrhœa is present, exposure to foul smells undoubtedly aggravates the already existing evil. I have heretofore remarked on the fact that the same micro-organisms which cause inflammations of the lungs may also be concerned in suppuration of the middle ear. In keeping with these pathological observations we find the lungs in certain cases undergoing inflammatory changes similar to those in the ears in consequence of exposure to fœtid vapours and gases.

Thus, after, and probably on account of smelling putrid water in which flowers had been too long kept, three children of the same family, as Dr. Broadbent informs me, were attacked with acute pneumonia. Several times I have been called down to public schools—the authorities might naturally object to my mentioning names—to see boys suffering from acute suppurative catarrh of the ear. Generally either scarlet fever, pneumonia, typhoid, or diphtheria has been going on at the same time. Were one to meet

with only a single case in a house, the attack might be attributable to other causes ; when, however, several children in one room are seized with otorrhœa, I always feel certain that they have been exposed to an escape of sewer gas. I saw two boys with otitis media from a large school, and discovered its origin before the epidemic of scarlet fever which followed attracted public attention to the insanitary condition there. The source of evil was thoroughly investigated and removed, so that the school may now be regarded as exceptionally healthy.

One's remarks as to the escape of sewer gas and its attendant ills are not always received with joy. I was called to a large charity school to see three cases of ear mischief. Everything in the place appeared as clean as one could wish, but there was the awkward fact of more than one child in the same room with discharge in the ear and high temperature. The enunciation of my opinion as to the existence of bad drains was received with undisguised scorn, the matron remarking that they had only just been put in thorough order by an *eminent* builder.

I insisted on having the drains looked to again, but not by an eminent builder. I suggested that a Medical Officer of Health should be called in, and he very promptly discovered three cesspools under the room in which the little girls slept. The very same thing occurred in my own house : the distinguished builder failed to ferret out anything wrong, although he charged pretty freely for his search. The Medical Officer of Health whom I called in at once came upon a cesspool under the coal-cellar, and after its removal my children had no more trouble.

I remember being requested by Mr. Juler to see a

clergyman who was at death's door with fever and high temperature, having double perforation and profuse discharge. He slowly recovered sufficiently to be moved out of his house, and then he was well in a few days. I was called in consultation by another medical man to see a patient living next door to the last mentioned, ill in exactly the same way. We got him out of his house, and he made a remarkably speedy recovery. It is needless to say that in both houses the sanitary conditions were shocking, the so-called brick drains being all to pieces.

My father, I remember, told me a story to the same effect. Soon after the building of Westbourne Terrace, more than fifty years ago, there was a frightful epidemic of scarlet fever there, and in one row of houses many children died. Afterwards it was discovered that the enterprising builder had made drains, leading out of the house certainly, but reaching to the middle of the centre roadway only (many of you will know that there are three parallel roads), where they came to an abrupt termination, there being no connection with any main drain. A short time ago I saw in the Portman Square district some cases of diphtheria with ear mischief, due to the construction of a drain (no doubt to save trouble) with an outfall placed five feet above the level of the house pipes with which it was connected—the drain, in short, ran up hill.

So insidious is the character of sewer-gas poisoning that it is often overlooked by members of the profession until a vast amount of mischief has been done, if, indeed, it is recognised at all.

Thus, some years ago, a clergyman's medical attendant saw him and several of his family out of the world—the victims of typhoid, but left it to the next

incumbent to discover the huge cesspool under the floor-boarding of the vicarage kitchen.

Here is yet another case, the details of which I have from the chief sufferer, Dr. R., æt. 51, who presented himself to me for treatment on October 29th this year. This patient had resided in London since 1883; he formerly lived in India. Shortly after entering his present residence his wife had a return in a modified form of Indian intermittent fever. From this she always recovered on absenting herself from home. In 1886 an outbreak of diphtheria in the family led to an inquiry by a sanitary engineer, who condemned the w.c.s, and stated in his report that considerable quantities of sewer gas were driven through the various traps and pipes into the house. The remedying of defects was taken in hand by the landlord, with the usual negative results. In 1889 the doctor himself, who had frequently been seized with diarrhœa, sore throat, and discharge from the ears, had a severe attack of enteritis. In 1891 his wife's health broke down, and he himself had a three months' bout of diarrhœa and debility, with loss of flesh and great depression of spirits. At the end of the year Mrs. R. was prostrated by dysentery, her illness lasting six months, and ending only after she had gone away from home. In April, during her indisposition, attention was once more called to the drainage by a large quantity of sewage forcing its way through the traps into the flagged back yard, *under the window* of the bedroom occupied by Dr. and Mrs. R. This was attended to, but whether properly it is impossible to say. On August 27th, Mrs. R., who had been complaining of sore throat, was found to have a well-marked diphtheritic patch on the right tonsil.

The sanitary authorities now again pronounced the w.c.s to be defective, and steps were taken by the landlord to have them rectified, but very slowly, and September was well advanced before anything was done. Whilst the work was in progress the smell of sewer gas was most offensive, and Dr. R. began a second time to lose flesh, and finally he suffered so much from sore throat and increasing deafness, with otorrhœa, that he sought my assistance, and acting on my advice, had his drains inspected by a Medical Officer of Health and put in thorough repair, with the result that all the troubles ceased.

This case shows, like many others, that suppuration of the ear is to be regarded as one among many possible manifestations of some morbid agent. We have evidence in the history just related of a common cause—sewer gas with bacteria floating in it—of various affections in five members of the same family, diphtheritic patches in many instances, repeated diarrhœa, otitis, &c. Dr. R.'s sad experience proves how little dependence can be placed in an ordinary builder's attempts at repairing drains.

No doubt a different state of affairs would exist if landlords were by law held liable for heavy damages in the event of injury arising from defective drainage.

Otorrhœa from the inhalation of sewer gas is commonly associated with various symptoms indicative of its source. In the case of a patient, Mr. M., æt. 32, whom I saw in October last, there had been a mild attack of peritonitis, apparently from exposure to cold in the country, but probably in the main dependent upon an impaired condition of health. On the 17th of September he had returned home and had resumed

duty as secretary at a distance from his own house. On the 25th, having previously suffered from severe sore throat with high temperature and feeling of *malaise*, he noticed hardness of hearing in his left ear, which felt as though blocked with wax. On the 26th he saw a chemist, who suggested that his trouble was due to a slight cold, and recommended the application of mustard behind the ear. A profuse oily discharge commenced to flow from the ear at night-time, and by the following morning he was completely deaf, and had severe ear-ache. His medical attendant whom he now consulted, advised him to steam the ear, and to continue counter-irritation. His pain on the following day was intense, so that for hours he could not sit still. Two days later the pain was nearly gone, but there was a constant discharge from the ear, and deafness was complete. He again saw his medical man, who sent him to see me. I found the ear blocked up with diphtheritic membrane. After the removal of this a perforation of the size of a small pin was visible, through which thick pus was flowing. I prescribed a lotion containing lead acetate, tincture of opium, and glycerin (changed later for boracic and salicylic acids), and urged him to have the drains of his house seen to. After some further persuasion on the occasion of my second visit, the patient called in a sanitary inspector, who reported that all the drains in the house were not only in perfect order, but were contrived on an excellent system. Soon afterwards, however, I learnt that there was a direct escape of sewer-gas into the room in which my patient had been in the habit of working as secretary. I need hardly tell you that he did not again subject himself to the influences of the atmosphere of that room. After a month's treatment the

perforation healed, and the hearing became nearly normal, but, as in many other cases of diphtheritic poisoning, the general health has been much impaired, and its complete restoration is necessarily taking place only by slow degrees.

Cases similar to this, and due probably to the same cause, appear to be common in some parts of India. Last year I had five or six patients from there, all suffering with precisely the same symptoms as Mr. M.

As Miss Florence Nightingale wrote a short time since :—

“We have learnt that we have national health in our own hands—local sanitation, national health. But we have to contend against centuries of superstition and generations of indifference. . . . The sanitary reform must be a work of years, not of a day. But there must not a day be lost in beginning it.”

I have already alluded to sea-bathing as a cause of inflammation of the ear. I have reason to believe that sometimes this ailment is not a result of the mere irritation caused by the entry of the salt water, and subsequent cold-catching, but that the bather's opportunities of provoking a sharp attack of inflammation of the membrana tympani, and consequent perforation, are manifestly enhanced by the objectionable practice of emptying the sewage of our maritime resorts and large sea infirmaries and convalescent homes into the waters of our coasts. The odour at half and low ebb tides of the infected water and its deposit, for which local magnates and lodging-letters have no nostrils, too unmistakably proclaims that the sea is not always the accommodating scavenger that the drain contractor and speculative builder fondly imagine it to be.

Before proceeding to my next subject I should mention that the existence of a connection in the Eustachian tube between the throat and the tympanum renders the affections of the tube of considerable importance. These concern chiefly its mucous membrane, which may suffer from catarrh and its accompaniments, due to cold, direct irritants, and zymotic infection.

LECTURE II.

MR. PRESIDENT AND GENTLEMEN.—As in every other department of medicine, so in aural affections we must beware of allowing ourselves to take too narrow a view as to the causation of a given local condition. As an instance of the origin of perforation of the membrana tympani in an unusual way, I will put before you a case which my colleague, Dr. Sydney Phillips, has kindly given me leave to relate :—M. K., a girl, æt. 19, was admitted to the London Fever Hospital, under Dr. Phillips, on October 17th, 1892, with scarlet fever. The fever ran at first a mild course. Her temperature, which was $100\cdot5^{\circ}$ on admission, was normal on the 23rd. On the 28th, however, it commenced to rise steadily, and by the 31st it had reached 104° , when a two-grain dose of acetanilid was administered with a satisfactory result. The temperature remained above the normal, with fluctuations of about 3° , being generally lowest in the morning, highest in the evening, though on some occasions the evening rise was maintained until the next day, and required reduction with acetanilid. The symptoms accompanying this marked secondary fever were most singular. On October 30th there appeared a punctiform rash on the chest, with furred tongue and congested throat.

By November 3rd the rash had nearly gone, but the fever still continued, and on November 4th the temperature rose to $104\cdot2^{\circ}$, and there was pain in the back, legs, and small joints. Salicylic acid was tried, but had to be discontinued on account of the sickness it caused. There was swelling of the joints, especially of the fingers. Signs of dilatation of the heart became pronounced, and there was evidently incipient pleurisy. On November 11th the patient was very drowsy; the temperature in the morning was $100\cdot6^{\circ}$, and in the evening $102\cdot8^{\circ}$; the cardiac weakness continued, the pulse being 102, and the heart-sounds scarcely audible. Pleuritic crackling was heard during respiration, and at the base of the lungs crepitation with loss of resonance. A purpuric eruption appeared all over the body and legs, profuse epistaxis and hæmorrhage from the lungs set in, and the urine contained much blood.

Dr. Phillips diagnosed rheumatic purpura with hæmaturia, and ordered immediate cupping over the loins, with fomentations, and a mixture containing liq. strychniæ ℥ iij and tinct. digitalis ℥ v, to be taken every four hours. The treatment was immediately successful. The next day (November 12th), the heart's apex, which had been one inch outside its normal position, had returned to its place. The general condition also was greatly improved. There was recurrence of the epistaxis, but only in a slight degree, and the other signs were much less marked. The improvement continued for the next three days, and by the morning of the 15th the temperature had fallen to 99° ; in the evening, however, it rose suddenly to $101\cdot8^{\circ}$, the rise being accompanied by pain in the right ear. On examination, perforation of the membrane was found,

and tenderness over the mastoid process. After this the temperature fell to below normal, and remained so during the slow convalescence.

As regards the mode in which the perforation was produced, it is evident that there was an intratympanic effusion, which, by the inflammation and pressure it occasioned, was the cause of the rupture of the membrane, the condition of which, we may presume, was already impaired by antecedent congestion.

It may not be out of place here to consider for a moment the pathology of scarlatinal sore-throat, especially with a view to prophylactic treatment. There can be little doubt that the streptococcus isolated by Klein in cases of scarlet fever gains its entrance into the blood by way of the suppurating surface in the throat. By strict local antiseptic treatment of the throat it might, I think, be possible to restrict greatly the number of cases in which suppuration of the middle ear occurs. It is an old observation that rheumatism and pyæmia have many close affinities, and Mr. H. S. Collier, when house-physician at the fever hospital, noticed the degree of post-scarlatinal rheumatism to be, in the majority of cases, in direct ratio to the amount of suppuration in the throat. This led him frequently to sponge out with solution of perchloride of mercury the throats of the scarlet fever patients, in none of whom so treated did he ever observe the occurrence of rheumatism.

I feel greatly indebted to Dr. Phillips for bringing to my notice the case I have just described, and I venture to think myself justified in having dwelt upon it at considerable length, as I have thereby afforded to those indulgent enough to listen to me an opportunity of sharing my interest in it.

Traumatic perforation.—Rupture of the tympanic membrane when produced by an explosion, such as that of dynamite on the Metropolitan Railway some years ago, showed in the seven cases brought to me at the hospital not a round opening like that seen in chronic otitis, but a transverse slit. A large number of instances of traumatic rupture of the drum-head are due to carelessness or the perpetration of meaningless tricks. A child was sent to me by Dr. Morton, of Guildford, whose ear had been injured in the following way :—A young friend put a knitting needle close to her ear and then shouted at her. The child thereupon turning her head, the sharp point of the needle entered the middle ear, wounding a small artery, and causing profuse and nearly fatal hæmorrhage, which lasted off and on for a month. When at length the bleeding was stopped the perforation soon disappeared.

A man at the hospital put a piece of straw in his wife's ear, and then called her name suddenly, and with a result similar to that just related, except that the hæmorrhage was only slight. After intense pain for some days the ear healed readily, as is usual in such cases.

Boxing the ears is a potent cause of rupture of the drum-head. Of the truth of this I used to have a great many examples at the hospital, but, latterly, I am glad to say, they have become rare.

Fortunately for the future generation, School Board teachers have been taught, by sundry prosecutions and by bitter experience, that this simple and old-fashioned remedy for mental inaptitude is not only dangerous to their pupils, but an expensive luxury to themselves. In public schools boxing the ears is, I should say, almost unheard of ; at some of the preparatory schools,

however, it cannot be uncommon, to judge from the cases I have been called upon to treat. It was yet more frequent formerly, for I still see many old-standing cases of otorrhœa, due to loss of temper by some overtaxed master, whose self-control had been momentarily lost. Not twenty years since, the undergraduates at one of our universities used to have pointed out to them the melancholy spectacle of an amiable and well-read youth, of gentle birth, stone deaf, and unfitted for any active social intercourse with his fellow-collegians, because his ears had been made the recipients of his own father's "apostolic blows and knocks." Although I do not imagine those that indulge in ear-boxing can know the mischief and life-long misery they are apt to occasion in causing injury to one of the senses, and loathsome discharges which render the sufferer almost unbearable both to himself and his friends, I yet think that any teacher guilty of the practice should be dismissed his post as too stupid a person to be entrusted with the care of the young.

Before quitting the topic of perforation of the membrana tympani, I wish to add a few words with respect to its treatment. Inasmuch as injury to a well-conditioned drumhead heals with great rapidity, it is clear that our chief aim, where perforation has occurred, must be to get the ears with all speed into as healthy a state as possible.

Delay is dangerous, for what in the generality of cases of perforation from acute catarrh is only a slit becomes, by the constant passage of discharge, converted into a circular hole, the closure of which may be difficult or impracticable. In treatment, experience, I need scarcely say, must be our guide, and the symptoms of each individual case must be carefully con-

sidered. A further important requisite is to ensure, so far as feasible, that one's instructions shall be carried out.

With regard to the important question of treatment, having ascertained the nature of the patient's ailment, our next care must be to remove its cause, and to remedy, if possible, the mischief already done. It is both interesting and instructive to institute a comparison betwixt the practice of former times and that of the present day. From the old writers on medicine the subject of aural disease received on the whole, so far as one can ascertain, but scant attention. Pliny's enumeration of approved remedies for diseases of the ears certainly does not inspire us with any feelings of regret that our lot has been cast in later days than his. If what was preached by the pharmacologists of his time was actually practised, it is difficult to perceive how either patient or physician could have possessed the other's confidence.

For suppuration of the ears, bull's gall warmed with honey, or vinegar with the same or with the gall of goat or sea tortoise, was recommended. The warmed urine of a she goat as a lotion, or in combination with axle-grease for a liniment for the ears was another choice specific, the effect of which was supposed to be enhanced by smoking it in a goat's horn for twenty days. For the most desperate maladies of the ears a warm injection made from dormouse skinned and drawn, and boiled in a new vessel with honey, or from earthworms boiled with goose-grease was reckoned highly efficacious; and the fat of frogs injected into the ears was held to instantly remove all pains in those organs. (a)

(a) Pliny, "*Historia Naturalis*," lib. xxviii, 48; xxix, 39; xxxii, 25.

Despite the advances from time to time made in medical knowledge, it is by no means evident that throughout the Middle Ages, or indeed until within quite a recent period, any considerable improvements were made in the science and practice of medicine or of aural surgery. It was in vain that Roger Bacon, in the 13th century, called attention to the fact that speculative alchemy—which, as modern chemistry, has revolutionised the ideas of mankind with respect to the constitution and the modes of operation of remedial agents—had no place in the books of Aristotle or in the teachings of the natural philosophers. Through ignorance of alchemy, he urged, “neither speculative nor practical medicine can be mastered, not only because natural philosophy and speculative medicine are required for the practice of medicine, but because all simple remedies are derived from this science.” His voice fell dead in a time of barbarism and credulity : there was no master soul in his day, or for centuries after him, that could follow the leadings of his gigantic intellect. Men remained content to copy into their manuals of physic and to repeat in their lectures the saws of the ancients, to which they added the embellishments of their own fancy. “The mind of the Middle Ages,” as Edward Peacock has remarked, “must for ever remain a puzzle or a blank to those who do not take some pains to understand its childlike faith and abject superstition ” (*The Academy*, Oct. 25th, 1879). In medicine the truth of the assertion that any hypothesis is better than none is not always apparent ; we find Dr. Bonet, of Geneva, for example, who, writing in the latter half of the 17th century, gives many excellent practical hints to the aural surgeon, gravely

discussing in his chapter on diseases of the ears (a) the question "Whether should we vomit or purge in pain of the ears?" and citing the opinion of Hippocrates that "If pain arise in the ears it is good to wash in much hot water, and to apply a fomentation to the ears, and if by these means attenuated phlegm depart from the head, and the pain cease, these things are sufficient; but if not, a vomitory potion is the best medicine..... If by this means the pain assuage not, let cooling things, actually cold, be poured in, and let a potion be given that purges downwards, and not upwards, because a vomit will do no good."

Passing to modern times, and considering the ways and means at the disposal of the practitioner, we may say that we have an almost embarrassing choice of medicaments and methods of treatment of which our immediate forefathers knew little or nothing. It would now be difficult indeed to be wise above what is written, for every year brings us its bevy of new drugs, each with its attendant literature, and each, were one to credit implicitly the statements of some of their importers, possessed of properties so various as to put to flight almost every imaginable ill that man is heir to. Our care must be, while not forgetting the old and approved methods, to select from what are new those which offer to the patient still greater advantages in treatment than the ones which we have hitherto been able to provide.

Sometimes the most obvious precautions are omitted in the mode of treatment. For example, I constantly see cases of perforation with otorrhœa for which strong boracic lotion has been used without first removing pus

(a) "*Mercurius Compitalitius: or a Guide to the Practical Physician*," London, 1686.

from the meatus. When the accumulation there is cleared away the membrane heals. If the ear is kept constantly clean a recently perforated membrane is as a rule soon well. It should be the practice, when there is a thick discharge, to remove it at least three times a day. Oftentimes deafness is due to deposit on the membrane, fenestræ, or ossicula, or to swelling of the mucous surface of the drum-head, and the thorough washing of the tympanum with antiseptics is of great advantage. This may in some instances be effected by the use of an intratympanic syringe introduced through the perforation; the inflation of the tympanum by Valsalva's or Politzer's method should then be resorted to. As Hinton long since observed, it is desirable sometimes to touch the edges of the perforation with silver nitrate. One discovers very commonly in dealing with chronic cases of perforation that some highly stimulating lotion has been employed, month after month, without any change, and that the ear in consequence has become excoriated and painful. The adoption of a milder application may be all that is requisite to effect a cure.

When the process of cure is sluggish, a change of lotion is generally, as in the cases just mentioned, of great assistance. Thus, for acetate of lead one may advantageously substitute boracic or salicylic acid, thymol, carbolic acid with glycerin, rectified spirit, and tinctura opii, or zinc sulphate with carbolic acid. Lotions containing lead generally act all the quicker for the previous employment, for a few days, of a zinc solution.

One can lay down no hard and fast lines of treatment for suppurative inflammation of the middle ear, but the following general indications, in addition to

those already alluded to, should be borne in mind. In all cases one must ascertain how far the patient's general health is in fault, and must use the requisite constitutional remedies, as in those examples of ear disease complicated by syphilis of which I have made mention, or in struma among children, in which otitis is unaccompanied by pain, just as in the fatal case of phthisis which I spoke of on a previous occasion.

The immediate relief of pain is of prime importance. To this end, free leeching and counter-irritation behind the mastoid with equal parts of tincture of iodine and blistering fluid may be employed. Cold compresses, frequently changed, may sometimes be useful, as Weber-Liel has shown, in place of leeching. Glycerin of carbolic acid poured into the meatus is a useful anodyne, and of the value of antipyrin taken internally I have already had occasion to speak in my last lecture. In the acute catarrh of young children—of which one sign is refusal to rest the head on the affected side—poultices should be avoided, as they only promote suppuration, and pain is, I find, best relieved by frequent fomentation of the external meatus with warm water. Mild purgation and the use of Politzer's bag are also of assistance. Many an earache might be completely prevented by timely politzerisation, as it renders the Eustachian tube pervious, and equalises the pressure on the drum-head. In children it acts well without any accompanying act of deglutition. Until pain has subsided, warm water should be poured into the ear, and syringing and the use of stimulating applications should be shunned. Afterwards weak and soothing lotions, such as solution of acetate of lead and tincture of opium, may be resorted to. Perchloride of iron and silver nitrate are unsuit-

able for acute cases. Powdered boracic acid or, occasionally, alum may be very efficacious, but the insufflation of powders is not to be recommended except in chronic cases where there is a large perforation. Strong lotions are applicable only in old-standing cases of otorrhœa. The stoppage of discharge through their use when perforation has but recently occurred, or when pain is still present, may be productive of meningitis or mastoid abscess, the edges of the perforation being stimulated to close before cessation of discharge. In chronic cases of otorrhœa, as we have seen, rectified spirit may be of signal service. Dr. W. E. Johnson (Proc. Amer. Med. Assoc., 1892, *Journ. of Laryngology, Rhinology, and Otology*, No. 10, 1892) recommends hydrogen peroxide—a 15-volume solution is the strongest required—as a non-toxic germicide, $1\frac{1}{2}$ times stronger than mercury bichloride, in catarrhal and suppurative otitis and in mastoiditis after incision. It acts by evolving nascent oxygen, and its effervescence during decomposition effects the separation of products of unhealthy action. Causing the disintegration and removal of carious and promoting the growth of living bony tissue, it may, as he says, obviate the necessity of scraping a diseased mastoid.

Although it is the cases of chronic otorrhœa, those, in fact, which the most frequently occur in practice, and which mainly result from early neglect, that prove the least susceptible of remedial measures, and the most apt to give rise to troublesome otorrhœa, still, in these the sufferer's condition can be at least alleviated by painstaking, prolonged, and well considered treatment. Of this you have already, I think, had some evidence among the histories recited to you, so I will refer briefly now to only one illustrative case. I had a

patient, æt. 32, who for aural disease and more especially otorrhœa and concomitant ailments had visited an extraordinary number of doctors and of those professors of smooth things—quacks—during a period of no less than 24 years. The outcome was that, as he says, instead of getting better, he settled down into a state of total deafness. I did not, on examination, regard his case as at all desperate, and after pursuing for some weeks the course of treatment I had prescribed, he gave me the following satisfactory, if quaintly expressed, account of himself:—

“My hearing has now become almost perfect in the left ear, and I think and hope there are symptoms of returning power in the right. I have had conferred on me the greatest possible boon, for whereas before my life was a perfect purgatory, and only borne with for my little ones’ sake, it is now so changed that I find life worth living for its own sake, as I can now converse with my fellow-creatures, and, instead of the surly, boorish object I was settling down into, am now more like my own natural self,”

I must now pass on to my next subject, the suppurative diseases of the external auditory meatus, referring as briefly as possible to some of its skin diseases, the origin and treatment of circumscribed abscesses, and, lastly, exostoses of its walls co-existent with a flow of pus. Von Tröltsch’s observation that there is no justification anatomically for speaking of *catarrh* of the external meatus holds perfectly true, except as regards the occurrence of acute moist eczema. This disease, in one phase, may appear between the ear and the head, but a variety much less amenable to treatment is that met with within and around the meatus, and is originated by the patient’s scratching of the

ear to alleviate irritation caused by some chronic discharge. For its successful treatment, arrest of the discharge from the external meatus is manifestly a requisite. Careful cleansing of the meatus and the application of a small quantity of dilute nitrate of mercury ointment—preferably first melted—are remedies generally efficacious. Other ointments or vaseline alone may be better tolerated, or lotions (*e.g.*, a solution of chloral hydrate) may prove yet more successful. In chronic cases the application of oil to remove scabs and then of tar lotion (Wright's liquor carbonis detergens ℥j to ℥iv of water) is usually operative.

Contagious impetigo, the result of inoculation with staphylococci, is characterised by a thick and purulent discharge, which with scabs formed in the meatus sometimes obstructs the passage of sound. Boracic fomentations and carbolic lotion for the ear, to be followed, if needful, by applications of calamine ointment, and also the exhibition of tonics are useful remedies.

Boils in the external auditory meatus frequently claim our attention. *Staphylococcus pyogenes*, var. *albus*, is the organism usually present in the pus they yield. This bacterium and allied forms, according to Löwenberg, find their way into the subcutaneous tissue of the meatus by way of the gland ducts. Foul air, as I have shown, and the employment of aural applications in a putrefactive condition are among the causes of boils. The occurrence of furunculosis as an epidemic points very clearly to its parasitic origin, and this again accounts for the beneficial effects of alcoholic solution of boracic acid in its treatment, after the flow of pus has begun. The relief of pain

due to tension and the resolution of the boil may be effected by a free incision,—if necessary, with leeching in front of the tragus, or by means of hot medicated lotions. As a palliative during the later stages of the disease, glycerin with opium is in my experience more operative than any other preparation. Menthol in parolein or glycerin of carbolic acid or of belladonna may be of great assistance. Grünwald (*Münch. Med. Woch.*, March 1892) recommends the application of a 20 per cent. solution of aluminium subacetate on cotton wool. Again, Davidson (*Therapeut. Monat.*, No. 12, 1891) speaks favourably of the action of dermatol, or bismuth-gallate, in otitis externa and some instances of chronic otitis media, but not in acute conditions, in which it causes dangerous symptoms by caking. In aural furunculosis of gouty origin, Dr. L. Turnbull (*Med. Times and Register*, Philadelphia, Oct. 1891) finds it best to wash the ear with alcohol containing boracic acid, then to paint with a 1-in-2,000 aqueous solution of mercury perchloride, and, lastly, to apply a vaseline ointment of yellow oxide of mercury, quinine and liquor potassæ being administered internally. An aural boil of traumatic origin is, as a rule, cured without difficulty by means of mild anodyne applications. In addition to the removal of the boil and its cause, it is imperative, as I need scarcely remind you, to pay attention to the condition of the patient's health, which in furunculosis is usually debilitated.

Another example of aural furunculosis presenting many features of interest is that afforded by the case of Mr. F., a solicitor, æt. 29, sent to me by Mr. Malcolm Morris, Nov. 29th, 1892. A year and a half previously, he states, his left ear became swollen and exceedingly

painful, and discharged profusely. A violent bilious attack ensued. The condition of his ear then improved, but a few weeks afterwards pain and swelling returned, affecting both ears, and they have continued to trouble the patient at intervals of two or three weeks ever since, and invariably as the precursors of biliousness. Unwholesome diet does not appear to influence their production, but they almost invariably precede a heavy fall of rain. On several occasions when both ears have been swollen there has been considerable inflammation with pain and a feeling of tumefaction in the throat, and when the symptoms have been most pronounced there has been soreness all down the right chest.

Without a fuller history and more precise details it is impossible to speak with certitude as to the source of the curious phenomena manifested in this case. Unless their periodicity points to some unsuspected malarial taint of constitution, one cannot help surmising that the whole of the symptoms may have their origin in the prevalence, from time to time, of certain zymotic conditions. Mr. T. B. F. Eminson, in his suggestive and carefully worked out thesis on "Epidemic Pneumonia at Scotter," in speaking of the production of the pneumo-bacillus, has shown cogent cause for believing that, granted the presence in a sewer of semi-solid nutriment for its growth, together with a constant up-stream of air—a natural consequence of a good fall in the sewer, one has, in the absence of efficient flushing of drains, all the necessary conditions for the cultivation of that organism. Its conveyance to neighbouring places would then be simply a matter of direction of wind. The recurrence of boils in the ear, in accordance with certain climatic

states certainly would seem to indicate the development of staphylococci or other microzoa, occasioning furunculosis in conditions similar to those just enumerated as favouring the growth of the pneumobacillus.

One of the possible results of otitis or eczema affecting the external auditory meatus, especially in damp and impure atmospheres, is the appearance there of some one of the species of *Aspergillus*, generally *Aspergillus niger*. This is best combated by the injection into the ear of alcohol in warm water, though with the lower-class Russians, among whom parasitic otitis externa is more especially prevalent, this use of alcohol is not, I believe, so popular as taking it internally.

The new growths in the meatus resulting from suppurative otitis induce spongy exostoses (osteomata). These may be preceded by polypus, are usually pedunculated, and have the appearance on microscopic section of newly-formed bone. They can easily be removed, as I suggested, with dental stump forceps. The true ivory exostoses of the ear I do not now purpose to deal with, except in so far as they are connected, as an effect or cause, with aural suppuration. Their origin seems to be in some mechanical irritation, one source of which I long since showed to be, in all probability, due to the ingress of salt-water into the ear. I was led to this conclusion after having operated on four gentlemen with double ivory exostosis, who were in the habit of daily bathing together in the sea on the south coast of Ireland.

It is when the growth of an exostosis threatens to prevent the escape of pus from the ear that its removal is absolutely necessary, even though there

should be no very appreciable loss of hearing from the occlusion of the meatus. The true ivory exostosis, as I many years ago demonstrated, may be safely drilled with the dental engine. I have treated over one hundred cases by this means, and I have seen no reason to swerve from my originally expressed opinion that it is superior to all others for the penetration of these excessively hard tumours. At times ivory exostoses give rise to danger by exerting mutual pressure, and so causing painful suppuration, and they then require prompt treatment. One patient, sent to me by Mr. Swanwick, of West Hartlepool, suffered from increasingly alarming and frequent epileptiform fits, so that for some months he was afraid to lie down at night, being apprehensive of a seizure. His condition was apparently due to the retention at some time of secretion in the right ear, which was almost completely blocked by an exostosis. After I had drilled through the growth, the patient recovered his hearing, and had no repetition of the fits. In a similar case sent to me by Mr. Swanwick nine years later, one meatus was nearly closed, and pus was issuing from it. After the drilling of the exostosis there was no recurrence of discharge, and the hearing became normal. In another instance of purulent discharge with exostosis, the patient, in spite of my repeated warnings and the urgent representations of his medical attendant, persistently deferred operation, and in consequence died of cerebral abscess before assistance could be rendered him.

I have lately seen with Mr. Hale a case in which ivory exostoses blocked the auditory meatus to such an extent that, owing to pent-up pus in the drum, a mastoid abscess was threatened. This gentleman perforated his membrana tympani through bathing in a

river in France, and hurried back to London in consequence of the very severe pain. He eventually recovered.

As regards the condition of the meatus after drilling for ivory exostosis, I may remark that there is occasionally great difficulty in getting rid of the discharge. As a rule there is very little or no pain; the inflammation set up by the drilling subsides; and very little further trouble is experienced. In some cases there is extremely severe pain, which can be relieved only by local applications of cocaine and morphia. It is in these instances that the suppuration is generally profuse, and it may last for weeks or even months. Troublesome granulations, also, are apt to spring up, which it is advisable not to attempt to eradicate until after the treatment of the inflamed surfaces with a 20 per cent. solution of cocaine; cauterisation with silver nitrate or chromic acid must then be resorted to. Occasionally the granulations recur again and again, and the best topical remedies are lotions containing iodoform, boracic acid, and spirit. Why some few patients after the drilling of exostoses have severe pain, while others enjoy complete immunity therefrom, I am at present quite at a loss to understand. The degree of nervous irritability certainly does not appear to be conditioned by the relative ages of the patients. With ordinary precautions, the operation is, as I think most aural practitioners will now admit, one of the safest in the whole realm of surgery.

The only case in which I have seen any dangerous symptoms follow in the train of the operation was that of Mr. B., æt. 68, whose ears were both drilled by me some years ago. He recovered perfectly from the

effects of treatment, but, as he was a great fox-hunter (having, as he told me, broken nearly every bone in his body by falls from his horse), he chafed under the restraint of the sick-room, and insisted on what he termed "taking the air," that is, putting his head out of the window in an east wind. On my expressing my reprobation of this practice, directly my back was turned, he left the surgical home in which he was located and took apartments in a house with the most malodorous of appointments. Suffice to say that, for one thing, days before his arrival there the water had been cut off by the supplying company. I will not attempt to describe the effluvium which greeted me on the threshold when the door of this new abode of my patient was opened. I found him with high fever and quick pulse. Erysipelas, beginning in his left ear, had spread to the right ; and eventually it attacked every part of his skin. This was followed by double pneumonia. I had at one time great doubts of his recovery; eventually, however, his iron constitution triumphed. Directly he had the chance, he resumed hunting, and contrived very effectually to fracture a femur and several ribs by falling with his horse on top of him. He was nevertheless soon able to go about again with unimpaired vigour ; and he now, as heretofore, takes every morning his cold plunge in the swimming-bath built in his house.

I need hardly say that this gentleman's ailments subsequent to the operation for exostosis were entirely due to his own recklessness. I am glad to be able to report that the recovery of his hearing was as thorough as that of his health.

In the case of Mr. G. C., æt. 45, a patient of Dr. Cheadle's, whom I saw in consultation, and on whom

I eventually operated for double ivory exostoses last year, I had to deal with incessantly recurring and rapidly growing granulations on the drilled surface of bone, so that two months elapsed before the hearing could be restored. Such obstinate cases, I find, are best treated by means of a lotion composed of salicylic and boracic acids in rectified spirit. It is almost superfluous for me to mention that applications so strong as this must not be employed early after the operation, or indeed at all until inflammation has completely subsided; some instances of their untimely use have probably given rise to the popular error that the arrest of a discharge must necessarily occasion abscess of the brain, which, indeed, it might do in cases of this sort. It should be a canon in practice not to resort to powerful lotions where acute inflammation is in progress.

I must now proceed to devote a few words, however brief, to the subject of aural polypi, which are among the common products of long-continued suppuration of the middle ear, and in fact usually owe their origin thereto. Aural polypi are referable to four different types, namely, those composed of granulation tissue, and the mucous, the fibrous, and the hyaline myxomatous varieties.

The first named are small, soft, highly vascular, globular bodies, composed of rounded cells in a hyaline or granular stroma. The mucous polypi, like those just mentioned, are very vascular, and present a mucous matrix lying within the interstices of areolar and connective tissue with small and usually angular or fusiform cells. The hyaline or myxomatous polypi are very seldom met with. Their gelatinous matrix contains a

network of branched and fusiform cells, scattered round cells, and numerous blood-vessels.

The customary seat of an aural polypus is the middle ear, from which it protrudes into the external meatus through a perforation in the membrane. Most of the smaller polypi can be best destroyed by the persistent application of caustics. The larger polypi are, in my experience, most suitably removed by means of Blake's form of Wilde's snare. Their eradication, if care be subsequently taken to keep the ear thoroughly free of discharge, and to apply suitable lotions, is usually followed by the speedy cure of otorrhœa, even when this has continued for many years. The obstruction offered by a polypus to the escape of pus from the tympanum may be productive of severe headache, and may even endanger the patient's life. On the removal of a polypus it is advisable, after syringing with warm water, to instil a 10—20 per cent. solution of cocaine, the styptic properties of which are very beneficial. The exact site of the polypus must next be cauterised or, if needful, curetted. The destruction of granulations may be effected by frequent cauterisation or curetting, or preferably, as I think, one may in most instances adopt Politzer's plan of discouraging their growth by the application of alcohol, which is best employed mixed with 25 per cent. of glycerin. This application should not be allowed to remain in the ear longer than twenty minutes, after which the injection of the lotion for the treatment of the otorrhœa must be proceeded with.

I must not forget to mention among the predisposing causes of otitis media the occurrence of adenoid growths in the naso-pharynx. When from nasal catarrh there is congestion and thickening of the

mucous lining of the septum and the turbinated bones, polypoid growths may project into the naso-pharynx and cover the mouths of the Eustachian tube. Furthermore, the spread of inflammation from the nasal passages induces swelling of the lymphoid structures of the pharyngeal mucous membrane (notably of Luschka's tonsil) and also of the adenoid tissue in the tubal orifices ; these in their hypertrophied condition constitute the "post-nasal vegetations" of Meyer, and obstruct the passage of air to the middle ear. Enlargement of the palatal tonsil affects the tube by restricting the movements of the muscles both of it and of the palate. Moreover, the mere blocking of the nasal passages in itself predisposes to catarrh of the tube by lessening the respiratory air current, thus altering the conditions under which it normally exists during the health of the individual. As the daily experience of the aural surgeon manifests, inflammation set up in the Eustachian tube, whether from the causes just named or from any others, for instance, epithelioma of the naso-pharynx and tonsil, is apt to spread to the middle ear, and there to establish suppurative catarrh.

MALIGNANT DISEASE.

The rarer results of suppuration include malignant growths in the meatus. A severe case of carcinoma of the ear was sent to me two years ago. The whole of the glands of one side of the neck were swollen, hard, and very painful, and there was a scanty discharge. I removed part of the growth, which relieved to some extent the intense agony from which the patient was suffering. She lingered afterwards for a few months.

So severe was her pain that morphia had to be given for weeks before death. Carcinoma is seldom seen in aural practice, and sarcoma, which is almost confined to the young, still less frequently. When cancer occurs it cannot readily be mistaken. An ordinary polypus, to which it has some external resemblance, is not very sensitive, whereas carcinoma of the ear is acutely painful, especially if touched; it is also of firmer consistency, and bleeds readily when interfered with. Its thin and not profuse discharge, and its occurrence in the more advanced stages of life are further diagnostic characteristics.

FACIAL PARALYSIS.

Facial paralysis occurring in the progress of aural complaints is, in the words of Dr. Hughlings Jackson, "scarcely an ear symptom; it is rather a bone symptom." Its existence is not to be regarded as irrefragable evidence of the wide extension of tympanic disease: all that it proves, as Von Tröltsch has pointed out, is that there has been "slight extension in an unfortunate direction."

Facial paralysis not peripheral in origin may be distinguished from that due to pressure on or inflammation of the part of the facial nerve between the geniculate ganglion and the point at which the chorda tympani leaves it by the alteration of the sense of taste noticed in the latter instance. It is true that this alteration is sometimes observed in the not uncommon affection we know as Bell's palsy, but then it is caused by swelling of the facial nerve in the aqueduct as the result of cold. The absence of suppuration in the tympanum in this condition serves at once to distinguish between the two affections.

Facial paralysis due to prolonged suppurative otitis may come on apparently from some slight cause, its development having simply been in abeyance in the absence of a sufficiently powerful excitant. Thus, I saw with Mr. T. Moore, of Blackheath, on Dec. 5th last, a lady who had for some years been a sufferer from otorrhœa. Last July she drove to her home near Aberdeen in a cold wind, and, like the case mentioned in my former lecture, directly afterwards was seized with facial paralysis. This was so severe that she was unable to keep food or liquid in her mouth. Under the influence of galvanism every day for three months her condition has improved, and she is to persevere in its use; but the paralysis has lasted so long that there is, I fear, not much chance of her complete recovery.

Any condition interfering with the free flow from the tympanum of pus there generated may be productive of this serious complication, facial paralysis. We have already seen how in an acute attack of otorrhœa an unyielding membrane may be its passive cause.

In chronic cases of otitis, such as those commonly met with after scarlatina and measles, polypus is sometimes operative in its production, as in the instance I am about to relate.

On Oct. 1st, 1886, a patient was admitted at St. Mary's Hospital for pain in the head and giddiness. He was unable to walk, and had facial paralysis and a temperature of 104° F., with very slight aural discharge. There was a history of scarlet fever with attendant otorrhœa.

I removed a large polypus protruding through the membrane, and so set free a considerable quantity of pus. The facial paralysis thereupon disappeared, the

temperature an hour afterwards had fallen to 98·8°, and recovery ensued with only one trifling relapse.

I need hardly say that when facial paralysis occurs from suppurative middle ear disease, degeneration of muscle soon sets in, to be followed, if the affection continues long enough, by distinct wasting; so much, indeed, might be inferred from the fact that the neuritis is peripheral. Correlated with and on the same side as the facial paralysis, is loss of taste, not of sensation, over the gustatory part of the tongue—a phenomenon not always noted, but of interest physiologically, in that it proves conclusively that the gustatory fibres come from the chorda tympani. These Dr. Gowers has traced from Meckel's ganglion, along the Vidian and the great superficial petrosal nerves, to the geniculate ganglion of the facial. The occurrence, together with the symptom just mentioned, of facial paralysis as a complication in middle ear disease is exemplified by a case at St. Mary's Hospital, first as an out-patient under Dr. Luff, and subsequently as an in-patient, the history of which I have abstracted from the excellent notes of Mr. F. J. Poynton.

F. J., a girl, æt. 20, who worked in a draughty shop, suffered in her seventh year from scarlet fever. Four months previous to her admission she complained of cold on the chest and slight deafness in the right ear, and after some time earache set in. With the discharge of pus from the meatus the pain ceased. Otorrhœa persisted for three months, and then, finding her face drawn to one side, the girl attended as an out-patient. She presented the usual signs of unilateral facial paralysis. Reaction in the affected muscles was absent with the interrupted, increased with the constant current. Taste was unimpaired on the left, but wanting

on the right side of the tongue, where sugar, acid, and quinine alike produced no sensation. The right side of the mouth was noticed to be drier than the left. The otorrhœa was treated on my advice by boracic irrigation and blisters. The patient was after a month admitted into the hospital, all remedial measures having been practically without avail. A month's treatment effected no improvement; indeed, the power of contraction in the muscles of the right side of the face returned only for a short time, and it had disappeared when the girl returned home.

As we have seen in the case just narrated, long-continued suppuration ending in facial paralysis may imply accompanying extensive and irremediable damage to the organ of hearing. In weakly or syphilitic subjects suppuration, short of causing death, will occasionally produce most extraordinary results, as in the instance I am about to relate:—Emily H., single, æt. 22, was sent from Fulham Infirmary to St. Mary's Hospital, where she was admitted under my care on Oct. 1st, 1893. She was pale and anæmic, mentally deficient, entirely blind in the left eye from interstitial keratitis, and nearly so in the right, and was suffering from complete right facial paralysis. Previous to her entry into Fulham Infirmary in 1887 she had from infancy suffered from offensive bilateral otorrhœa. During 1888 the discharge was sanguineous, owing to the presence of granulations; and subsequently there was a polypus, which was dislodged by syringing. Fœtid otorrhœa then continued as before. On her admission, Dr. William Hill, who was acting for me, found lodged in and projecting from the right external meatus what proved to be an exfoliation from the petrous portion of the temporal bone, including the

internal wall of the tympanic cavity and the cochlea and semicircular canals. The patient was too unmanageable for one to inspect the ear satisfactorily without an anæsthetic, but a rather deep cavity with a mucous surface free from suppuration could be perceived. The patient is now again in the Fulham Infirmary.

As you will note on examination of the sequestrum which I now hand round, according to Mr. Jackson Clarke's description in the catalogue (St. Mary's Hospital Museum, No. 805 A) it consists of a portion of the right temporal bone with the three semicircular canals almost complete. The vestibule and cochlea form one large cavity which is continuous with part of the internal auditory meatus. The specimen measures $\frac{7}{8}$ inch from apex to base. This large portion of dead bone was coaxed through the external meatus.

It may not be altogether out of place to say here a few words concerning the earlier stages of this grave syphilitic affection.

Some reference was made in my first lecture to catarrh of the middle ear as a result of an extension of the pharyngeal inflammation of the secondary stage of syphilis. In the same period of the disease mucous tubercles may be met with in the external meatus, and these are easily subdued by the ordinary local and constitutional treatment. Syphilitic disease of the labyrinth is a manifestation of far greater moment, to which I wish now to direct your attention. This may appear in the secondary, but is far more common in the tertiary stage of the disease.

Sudden loss of hearing, which may take place in a single night, and loud subjective noises are the most prominent symptoms. These indicate the immediate

administration of full doses of mercury, pushed even to salivation. Thus treated the progress of the mischief in the ear is usually arrested, and hearing may be restored. Neglect, on the other hand, may allow the inflammation to spread to the bone and the auditory nerve, with the result that necrosis ensues, as exemplified in the specimen before you.

The symptoms in tertiary syphilis of the middle ear resemble those just mentioned as occurring in the secondary stage. Large doses of iodide—20 to 30 grains thrice daily—are needed, and must be continued for weeks or months together. A timid administration of the drug may slow but may not arrest the destructive process. With the periosteal thickening of the tibia or gumma of a muscle, a surgeon may proceed with his iodide in leisurely fashion ; but in labyrinthine disease, as in gumma in the meninges, a sparing administration of the remedy is little short of criminal. One special difference between the secondary and tertiary affections should be noted, namely, that the former either is symmetrical at the outset or soon becomes so if the treatment is neglected, whilst the latter may remain unilateral throughout its course.

In my next lecture I shall proceed to speak of the recent advances made in brain surgery, in so far as they have a bearing on suppurative diseases of the ear.

LECTURE III.

MR. PRESIDENT AND GENTLEMEN,—Of late years the importance of a small cavity in the temporal bone, the mastoid antrum, has been fully established. When I was a student it used to be vaguely known as the horizontal mastoid cells. Both names are misleading, as the cavity does not lie in the mastoid process, but is bounded externally by the squamous, and internally by the petrous bone. Unlike the mastoid cells proper, which are absent at birth, and attain full development only after puberty, it is present from an early period of foetal life. In front it opens by a fair-sized aperture in the upper part of the posterior wall of the tympanum, whilst the mastoid cells proper begin as a downward prolongation of its posterior part. Lined with mucous membrane continuous with that of the tympanum, it shares and often prolongs suppurative processes therein. I need not dwell on the details of the topographical anatomy of the antrum, since they are given both fully and well in a variety of treatises. Through chronic disease, the antrum sometimes becomes greatly dilated by granulation tissue, and it may come to open into the external meatus, or on the

surface behind the ear, or elsewhere. A specimen in the Museum at St. Mary's shows it communicating with the external meatus and with the cavity of a cerebellar abscess.

Another cavity of the greatest importance to the aural surgeon, especially in relation to suppurative processes in the ear, is the attic, or maleo-incudal recess. Bounded externally by the membrana flaccida and the vertical portion of the squamous bone to which that part of the drumhead is attached, it contains the bodies of the malleus and the incus. The space is crossed by the external ligament of the malleus, and by bands of connective tissue covered with mucous membrane. Like the mastoid antrum, it is a favourite lurking place for chronic suppurations.

Cholesteatomata, which are masses of epithelial cells, cholesterin crystals, and inspissated pus altered by caseation and teeming with pyogenic cocci, are most frequently found in the attic and antrum. Formerly they were thought to be tumours, and now that view is again being taken, the large flat cells which they contain being found to result from proliferation of the tympanic epithelium.

Their importance to the surgeon is very great. They frequently occasion severe headache. Tending to increase in size, they excite chronic inflammation around them, with such results as perforation of the membrana flaccida and caries of bone with all its possible extensions. By lengthening the duration of suppuration they expose the patient to the risk of pyæmia ; their removal then is in all cases called for. They may sometimes be broken up by repeated syringing with antiseptic lotions ; but occasionally more daring operations are necessary. Thus, the antrum may have to be opened, or the malleus and incus removed, before the mass can

be completely got rid of. And here a caution is necessary, for, save by syringing, it is worse than useless to remove them partially by mechanical means. Such procedures only awaken the latent energies of the micro-organisms which abound in them, and niggling operations for their removal have more than once resulted in sharp attacks of otitis, accompanied by high fever and threatenings of meningitis.

Acute periostitis of the mastoid is generally the result of chronic otitis media, so that it is to be regarded more as a sign of deep-seated disease in the mastoid cells than as a morbid process. Sometimes, however, it is the result of the extension of inflammation from the periosteum of the external meatus. In most cases the preceding history serves to establish the cause of the affection.

As in periosteal inflammations elsewhere, pain is usually intense. Redness and œdema soon follow, the latter becoming diffuse, and pushing the pinna forwards. The slighter degrees of the affection will subside if the tympanum is frequently irrigated, and fomentations or leeches are applied over the mastoid. For more severe conditions Wilde introduced his vertical incision. We must remember that his operation is in many cases only palliative, and requires to be followed in a few days by opening up of the mastoid. Imperfect operations in past days eventuated only too frequently in chronic inflammation, with, according to its degree, sclerosis, caries, or necrosis of the mastoid,

ACUTE SUPPURATION OF THE MASTOID CELLS.

When the mucous membrane of the tympanum is in a state of suppurative inflammation, that of the antrum and mastoid cells is always more or less implicated.

Occasionally there is intensification of the inflammation through blocking of the drainage paths, too vigorous syringing, or the use of lotions too irritant in character. An attack of measles or scarlet fever in an individual already suffering from chronic otitis may also cause this condition.

Violent pain radiating widely, tenderness, and a sense of tension in the part are prominent symptoms, and there is high fever with all its consequences. For a considerable time there may be no external signs; but, as I have already remarked, acute peritonitis of the mastoid is often only a sign of suppuration of the mastoid cells. Wilde's incision is here of great service *as a diagnostic test*. If the pain and fever continue, we may be sure there is deep suppuration. When perforation of the mastoid is too long delayed the pus may penetrate in many directions. Happily in children the outer wall of the antrum is thin, and is traversed by the suture between the squamous and mastoid portions of the temporal bone, thus the pus often escapes externally; but, frequently, alas! subdural abscess, sinus phlebitis, meningitis, or cerebral abscess is the dread result of neglect.

Chronic inflammation of the mastoid cells has already been referred to, and is the result, as a rule, of simple chronic suppuration. In a few cases the condition has been shown by Zaufal to be tubercular. Caries and necrosis are the usual expression of chronic inflammation of the mastoid in which there is formation of granulation tissue, whether simple or tubercular. The antrum, as I have remarked, becomes dilated and often opens into the external meatus. Sometimes, the whole of the outer wall of the mastoid is destroyed, and presents an irregular cavity filled with granulations and

sequestra. It is destruction of the inner part of the bone which is the commonest source of cerebral abscess, phlebitis of the lateral sinus, and subdural abscess. When sequestra have been removed, and free drainage has been established, it is astonishing how rapidly healing is accomplished. But in tubercular individuals the process of caries and necrosis is often very inveterate, and the destruction of the whole of a temporal bone has been known to occur without the super-vention of death.

Sclerosis of the mastoid is a result of protracted suppuration. The density of the thickened bone is often extreme, and is the result of ossification of granulations, which replace the muco-periosteum lining the cells. The latter in bad cases become completely obliterated, as may also the whole of the cavity of the mastoid antrum. This phase of sclerosis is met with in all ages, even in childhood. It may occur apart from suppuration during the course of syphilis.

Mr. Pepper last year gave before this Society some cases which show admirably the results and treatment of chronic inflammation of the mastoid. His many and striking cases exemplifying the various conditions which necessitate opening of the mastoid he entered into so fully that I will confine myself to relating one instance only.

As an illustration of a common mode of origin of mastoiditis, namely, the occlusion of the external meatus by a large polypus, and also as an example of the benefit to be derived from its treatment by trephining, I may cite the case of W. B., æt. 22, who came to St. Mary's on the 8th August 1892, complaining of his right ear. On examination, a polypus $\frac{3}{4}$ inch long was found protruding from the external auditory canal.

Behind the auricle and close to the tip of the mastoid process was the orifice of a sinus, presenting an unhealthy look, and having everted edges. Along the sinus, from which pus was issuing, a probe could be passed for a distance of an inch and a half, taking a deep and oblique course in the direction of the mastoid antrum, where the bone could be felt to be bare.

There had been a suppurative discharge from the right ear for several years, and a gradual increase in the size of the polypus had been going on for some months. Quite recently an abscess had formed over the mastoid process. This had been lanced by the patient's medical attendant, but the opening had never closed, and had continued to discharge.

The polypus was removed with a Wilde's snare, on August 8th, by my substitute, Dr. Hill, and its stump was treated with solution of perchloride of iron till, by the 29th, all trace of it had disappeared, and the patient was admitted to the hospital for further operation.

On September 1st, the usual anæsthetic having been administered, and the surface shaved and washed, Mr. Pepper made an incision about an inch and a half long over the mastoid process, in a curved direction, somewhat parallel with the insertion of the auricle, and about half an inch behind it. On detachment of the periosteum the bone beneath was found to be roughened. A trephine, having a diameter of near half an inch, was now entered at about the centre of the incision, and allowed to penetrate the mastoid to a depth of a quarter of an inch, the circle of bone cut being removed with an elevator. A probe passed into the sinus was found to go through an opening in the digastric fossa, and was henceforth employed as a guide

for the position of the antrum. The remainder of the operation of laying open the sinus was effected by the hammer and chisel, used with extreme care and caution. The substance of the bone, being the seat of sclerosing otitis, proved to be excessively hard. Frequent use was made of the irrigator throughout the process. The bottom of the sinus having been reached, pus welled up freely, and, this being washed away, a quantity of granulation tissue was removed by scraping with a Volkmann's spoon. The opening into the antrum was soon approached, and sufficient exit for drainage being now apparently secured, the wound was stuffed with blue gauze, and a light suture was inserted at either extremity.

The patient remained in hospital till October 8th, by which time the wound had quite healed, though a sinus remained, having an opening external to the digastric fossa. Hospital confinement was evidently affecting his health, and granulations were appearing at the site of the old polypus; he was, therefore, sent home, and made an out-patient. Country air had the desired effect. After the sinus had been carefully syringed out with a 1-in-40 solution of carbolic acid for a week or two (the solution passing out again by the external auditory meatus), the opening completely closed, and the discharge came to an end. The granulations in the tympanic cavity proved rather more obstinate, and required curetting away once more and treating with strong astringent applications, followed by a lotion of salicylic acid and spirit. At the present date the aural discharge has practically ceased, and the patient has returned to his occupation.

With regard to the mode of performing the operation of opening the antrum, I would only say that in child-

ren it is better to use a small gouge, and in adults a small, sharp chisel.

I must now proceed to the consideration of cerebral complications in the course of aural suppuration.

May I ask you to scan with me a noble page in the history of surgery, a page written wholly in English and recording the work of British surgeons.

It is no new thing to speak of trephining for cerebral abscess due to ear disease. Indeed, I remember such cases when I was House Surgeon at St. Mary's. The operations were, however, only tentative, and it was a new epoch in brain-surgery which was inaugurated by the publication of Mr. Hulke's "Remarks on Trephining for Evacuation of Intra-cranial Abscess in Connection with Suppurations in the Ear." (a) His masterly and lucid account of three typical cases will ever be prominent in the literature of middle-ear disease. It was Mr. Hulke who first laid stress on the frequent occurrence of slow pulse and low temperature in intra-cranial otitic abscess, and on the untrustworthiness of local tenderness as a guide to the localising of the same. Three years later appeared the now classical lectures of Mr. Barker, in which the pathology of the cerebral complications attendant on ear disease is clearly and exhaustively dealt with. It would be impossible for me adequately to dilate upon the many excellencies of those lectures. I may remark that in the topographical anatomy and the details they furnish for the diagnosis of various intra-cranial pathological conditions, indicating, for example, the favourite sites of extra-dural and the limits of temporo-sphenoidal abscesses, in defining the symptoms of thrombosis of the lateral sinus, further in

(a) *Lancet*, July 3rd, 1886

advocating the use of small trephines, and in giving particulars of a series of successful operations, including the first for cerebral abscess performed by Mr. McEwen, they have proved simply invaluable to the surgeon.

Next Mr. Victor Horsley, (a) in his observations on a case of thrombosis of the lateral sinus in which recovery took place after septic embolism of the heart and lungs, suggested the opening of the sinus and the removal of clot after ligature and section of the internal jugular in the neck. The idea was subsequently carried into practice with complete success by Mr. Arbuthnot Lane. (b)

In 1890 Mr. Ballance (c) further added to the surgeon's resources by his useful essay, with tabulation of symptoms, on thrombosis of the lateral sinus.

Early in the present year (Feb. 18, 1892), my colleague, Mr. A. J. Pepper read before this Society his important paper on the "Graver Complications of Middle-ear Disease." In the discussion which followed, Mr. J. Jackson Clarke adverted to a matter of considerable interest to the aural surgeon, namely, that after the opening of the mastoid antrum it is desirable always carefully to examine with a probe its posterior and internal wall and the roof of the tympanum, in order to ascertain whether the cerebral abscess communicates with either space, and so can be drained through it without further operation. In one case an abscess cavity in the cerebellum opened through the medium of the antrum into the external meatus. Among the contributions to the literature of cerebral

(a) Clin. Soc. Trans., Vol. xix, p. 255.

(b) *Ibid.*, Vol. xxii, p. 262.

(c) *Lancet*, Vol. i, p. 1,116.

abscess, the statistics given by Dr. Newton Pitt in the "Guy's Hospital Reports" are of great value.

On account of the limitation of the time at my disposal, I must not attempt to pass categorically under review the various additions that have lately been made to our knowledge of the bearing of aural upon cerebral disease, but I cannot refrain from alluding briefly to the anatomical work accomplished with reference to this subject during the past few years. Horsley, Symington, Cunningham, Anderson, Makins, and Müller have all done excellent service in enlarging our acquaintance with cerebral topography. Professor Alec Fraser in bringing out his atlas, containing the results of the superposition of photographs, has afforded the surgeon weighty assistance in the carrying out of operations on the brain. To the aural surgeon, however, the work done by Professor Ambrose Birmingham is of the highest moment. In his papers on the mastoid region of the skull, (*a*) he has dispelled long-favoured illusions, has proved the accuracy of many assertions, and has established new truths as regards the anatomy of the lateral sinus. After a perusal of his writings, surgeons will be more than ever careful, when opening the mastoid antrum, to keep close to the border of the meatus. Little apparently now remains to be discovered with respect to the surgical anatomy of the mastoid region and the sinus, except in reference to children of various ages, Birmingham's observations having been restricted to adults.

The pathological importance of middle-ear suppuration is evidenced by the number of its graver complications. These comprise :—

(*a*) Dublin, 1891.

(1.) Facial paralysis from central or peripheral implication, meningitis, or abscess.

(2.) Suppuration of the mastoid cells, and sometimes also of the deeper tissues of the neck, from perforation into the digastric fossa, more commonly subperiosteal abscess, and necrosis and sclerosis of the mastoid.

(3.) Extra-dural abscess, *i.e.*, suppuration between the skull and the dura.

(4.) Meningitis.

(5.) Cerebral abscess from direct extension of septic inflammation along veins or lymphatics running from the roof of the tympanum, the mastoid antrum, or the lateral sinus, the abscess generally originating in a local meningitis, more rarely in septic arterial thrombosis, or general pyæmia.

(6.) Thrombosis of the lateral sinus and internal jugular vein.

(7.) General pyæmia.

(8.) Marasmus.

The intra-cranial lesion is usually associated with at least one other complication. In Mr. Barker's series of cases, meningitis and pyæmia were present in the largest proportion of those that were fatal.

In most instances, aural suppuration does not eventuate in intra-cranial complications until after the lapse of more than a year. The patient's general health may be excellent, so long as there is free exit for the pus. This may be hindered by swelling, polypi, cholesteatomata, bands of adhesions, or hyperostoses. Brain symptoms are not necessarily a concomitant of any apparent diminution in otorrhœa, though they are usually observed soon after its arrest.

Occasionally they mark the commencement of dan-

gerous inflammation. When the cause of the arrest of discharge is not discernible on examination, there may be obstruction in the middle ear, or, as Barker has suggested, deep septic erysipelatous inflammation.

Caries and necrosis of the temporal bone may go on to an extraordinary extent without causing cerebral mischief, as is evidenced by the specimen shown to illustrate remarks in my second lecture.

The pathology of brain disease due to otorrhœa is usually quite simple. In the case of a boy who had suffered from cerebellar abscess, there was delirium with retraction of head and abdomen, irregular respiration, and a temperature which rose for a short time four days previous to death to 102.5° , and afterwards remained about the normal until the end ; but, except in the ear itself, there was no lesion discoverable in addition to the abscess.

An outbreak of head symptoms may at times be determined by cold, a blow, foreign bodies in the meatus, operations, or chemical irritants ; usually it is only the final stage in a long series of insidious morbid changes, of which the patient himself has been quite unaware. It must not be forgotten that the mere accumulation of pus within the tympanum may give rise, as in the class of cases I have described as to be met with among children, to symptoms simulating those of basal meningitis. The special sign of incipient or, to be more precise, actively inflammatory brain lesion from aural suppuration is *pain*. Almost universally there is dull aching over, and pain radiating from the mastoid region, and racking headache. Oscillations between subnormal and high temperature with *rigors*, indicate pyæmia. The temperature in uncomplicated

meningitis is continuously *high*, as also in simple sub-dural abscess, in which, however, there are modifications according to the complications present. An *abrupt fall* in temperature after an initial rise signalises the completion of the development of an abscess ; the temperature then as a rule remains at or below the normal.

Other diagnostic signs of cerebral abscess are slow, full, and even pulse, vomiting and constipation (as in meningitis), sluggish cerebration, respirations which are rhythmical, but diminished in number and extent, and localised paralysis and convulsive movements. In meningitis there is usually delirium, and the pulse is quick, small, and irregular.

Marasmus is apt to occur in children during the course of severe aural suppuration, and it is a usual result, as one might expect, of meningitis and pyæmia, and is often marked in cases of abscess.

When in the presence of fresh symptoms in the course of aural disease, if the clinical evidence is inconclusive, one must first endeavour to ascertain whether they may be attributed to simple causes ; these being excluded, one must next consider in their order of severity the graver complications possible.

When once the cause of the symptoms is discovered, action must be prompt. I cannot but think that, with the knowledge we now possess, advice to postpone operative interference until it is obvious that recovery cannot take place without it is not only retrograde, but actually pernicious. There can be no doubt that the comparatively modern procedure of trephining for the relief of brain disease due to otorrhœa would have been still more successful than it has hitherto proved, had much earlier operation been feasible in some cases.

It is quite certain, also, that the timely opening up and medication of the mastoid cells and tympanum, as now practised, have averted many a serious lesion of the brain.

The extension of this necessary preliminary to intracranial operations renders possible the exploration for subdural abscess and phlebitis of the area around the *pars confluens*, that is, the junction of the so-called horizontal and sigmoid portions of the lateral sinus. The opening in the mastoid may be enlarged in order to enable one to reach the middle fossa or the cerebellum.

Even when the diagnosis is almost certainly that of diffuse meningitis, the penetration of the mastoid cells and tympanic wall and exploratory trephining by Wheeler's operation may be the means of saving life. Experience leads me to recommend for exploration the aspirating rather than a grooved needle. The whole should have a central as well as a terminal orifice, and no considerable suction power should be used.

Abscess of the brain in fatal cases has been met with in all its stages, from a patch of red softening to a well defined tough-walled cavity filled with green-coloured pus. Usually single and situated posteriorly in the brain, and apart from the motor tract, it rarely occasions paralysis. We may take it as established that the cause of traumatic abscess of the brain is always some agency external to the organ, namely, suppuration in some other portion of the body ; and the most frequent cause is necrosis or caries in the temporal bone from otitis media. In the severe type of brain abscess the petrous bone is extensively diseased ; there is thrombosis of its veins, and inflammation has spread to the brain and its membranes in the vicinity. In the

milder type of abscess the petrous bone is not notably affected. There is no thrombosis, and the cerebral substance and the membranes exterior to the abscess are healthy. The cause of the abscess would appear to be the formation of septic emboli, resulting from thrombosis of an artery which has been invaded by the spreading inflammation. Abscesses of the brain due to pyæmia, I should remark, are as a rule small and multiple. The chronic abscess may cause no external manifestations until the membranes are involved; and in some instances it appears to have exercised no appreciable influence in bringing about the patient's death. If it once becomes the focus of active inflammation, causing suppurative meningitis, death speedily ensues. When thrombosis of the lateral sinus has been established, inflammation may spread to the other sinuses of the side affected, or to the base of the skull, and also to the jugular, or this may be affected directly by extension of inflammation through the floor of the tympanum. The septic origin of the thrombosis is necessarily a consideration of far greater moment than the mere partial obstruction of the circulation by the blocking of venous channels. Thrombosis of the lateral sinus presents, in the main, the symptoms of general pyæmia together with earache, some headache, generally not severe, and often œdema and tenderness over the mastoid or along the course of the internal jugular vein.

The prognosis in many cases of impending suppuration of the mastoid is certainly difficult, and the question of operating is not one that can always be lightly decided in the affirmative. The length of the previous duration of the disease, the condition of the parts affected, and the constitution of the patient must

all be taken into consideration ; and in the absence of threatening symptoms it behoves the surgeon to have recourse to such means as are ordinarily effectual for the relief of inflammation. To take a case in point, a lady, Miss C. M——, suffered after typhoid from a series of abscesses, and finally from perpetual giddiness and from such acute pain in the left ear that she was unable to lie down to sleep. On consulting a physician, she was referred to a surgeon, who syringed some matter from her ear, and bade her return to him in three days to undergo an operation, adding that, in all his hospital experience, he had never seen such a bad case. In considerable alarm at the prospect before her, the patient called upon a second physician, Dr. Symes Thompson, who brought her straight to me. I found she had otorrhœa with pain, swelling, and tenderness over the mastoid. “Was she likely,” I was asked, “to have an abscess there?” I explained to her that the structures affected, if left to themselves, would undoubtedly suppurate ; but that probably the application of 8 or 10 leeches would arrest the inflammation, and spare her the ordeal of an operation. Acting upon my advice, she had 9 leeches applied on two consecutive days. The swelling was speedily diminished, but pain was only tardily relieved. I next ordered that blisters should from time to time be placed in front and at the back of the ear. After some months, the patient was fairly free from giddiness. Now, after the lapse of ten years, she expresses herself as being without discomfort, except for occasional tinnitus.

When there is inflammation of the mastoid process, and leeching and the removal of any existing obstructions in the meatus and tympanum have failed permanently to ameliorate the patient's condition, Wilde's

incision over the mastoid, as I have already pointed out, may give great relief. If, however, the symptoms grow worse, and there is deep-seated pain, caries of the petrous bone should be sought for, and an attempt may be made to break down the mastoid cells to set free imprisoned pus. In the absence of apparent disease of the bone, resort to trephining is clearly indicated. If there is unmistakable evidence that thrombosis of the lateral sinus exists, the surgeon can no longer afford to temporise, the extension of the thrombosis to the jugular being the next step towards general pyæmic infection. By central degeneration, purulent material is formed in the thrombus, and transport of portions of this to the right heart readily effects the plugging of small branches of the pulmonary artery. Exudation from the over-distended offsets of these branches then takes place, and pyæmic abscess of the lung results. This abscess may now act as a fresh source of infection, portions of the thrombi it occasions being carried to the left heart, and distributed thence, to repeat the original process in various organs of the body. There is evidence that in some instances abscesses of the viscera result from the passage of infective material direct to them, without any intermediate action upon the lungs.

To expose the lateral sinus it is convenient to employ a five-eighth inch trephine, selecting for its application a spot at a distance of one inch higher than the centre of the external auditory meatus, and one inch behind that point. Before the sinus is ligatured and laid open, whatever pus is discovered should be syringed away, also any carious bone present should be scrupulously removed.

To set before you in some measure what is implied

by neglect of inflammation of the brain and meninges resulting from aural disease, and the consequent extreme value of the modern surgical methods of procedure for its relief, I will now describe in brief a few cases among many similar which at a comparatively recent period were under treatment at St. Mary's Hospital.

M. A. C., a servant, æt. 19, who had been the subject of otorrhœa from childhood, entered the hospital on December 4th, 1876. She had been suffering from rigors, fainting fits, and headache. On the morning of the 6th, after a delirious night, she suddenly died. Examination of the body after death revealed antemortem clot in the left lateral sinus, softening of portions of the temporal bone, and pus in the left middle ear and on the under surface of the tentorium cerebelli.

Another case is that of C. T., a groom, æt. 20, who during 14 years had been deaf in the left ear, and had suffered at times from otorrhœa. He was admitted in an unconscious condition on July 13th, 1874. Nearly a fortnight previously he had been seized with pain in the head, reaching from the left mastoid to the temple. There were sinuses in the skin over the mastoid, and a free incision was made there. Under medical treatment the patient became considerably better, but on the 29th he commenced shrieking occasionally ; there was next exacerbation of the pain, and finally a lapse from a stupid into a comatose condition, in which he died on Aug. 4th. There was in this instance a large abscess full of brown pus between the dura mater and the right parietal bone, with inflammation and thickening of the dura mater of the right hemisphere, and complete disorganisation of the left lobe of the cere-

bellum, which communicated with the suppurating mastoid process.

Another example of fatal cerebral inflammation from aural disease is that of S. T., a strong man of 42, who early in April 1882 died suddenly, when under treatment as an out-patient for otorrhœa. The principal features at the post-mortem examination were a sticky condition of the arachnoid, yellowish puro-lymph in the meshes of the pia-mater, a small abscess in the left lobe of the cerebellum, necrosis of the temporal bone, and fœtid cheesy deposit in the tympanum.

In the case of S. G., a gardener, æt. 18, admitted January 24th, 1880, there was a history of otorrhœa during sixteen years. After three days' treatment, which had relieved pain in the right ear, he all at once expired. In this case there existed suppurative meningitis, some sloughing of the dura mater of the petrous bone, softening of the mastoid bone at the lateral sinus, where there was a yellowish-brown thrombus, and an abscess in the right hemisphere of the cerebellum. The tympanum and Eustachian tube were occupied by yellow caseous matter, and the incus and stapes had disappeared. I might mention many more instances of fatal brain complications attendant on ear disease which were under treatment ten or more years ago. Within the past few years, as I have already remarked, the aspect of the surgery of the brain has undergone a radical change. I think we may reasonably look forward to a time, not very far distant, when such cases as those which I have just described will be among the rarest of pathological curiosities. As one regards the position of the conscientious practitioner but a few years since—afraid and ashamed of a policy of non-intervention, yet

dreading the customary results of his non-antiseptic surgery, one is forcibly reminded of the words in which are described Christian's troubles in the Valley of the Shadow of Death :—"When he sought, in the dark, to shun the ditch on one hand, he was ready to tip over into the mire on the other ; also, when he sought to escape the mire, without great carefulness he would be ready to fall into the ditch."

Though much that lies in our way yet remains obscure, I think we may with thankfulness declare that we have now more than the twilight of early dawn to direct our footsteps.

If, Mr. President and Gentlemen, in the lectures which I must now conclude, and to which you have so kindly and so patiently listened, I have helped some few of my auditory in treading the difficult path of successful practice—the mitigation and the prevention of our fellow-creatures' sufferings, I shall feel myself infinitely repaid for any trouble I may have bestowed upon their preparation.



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